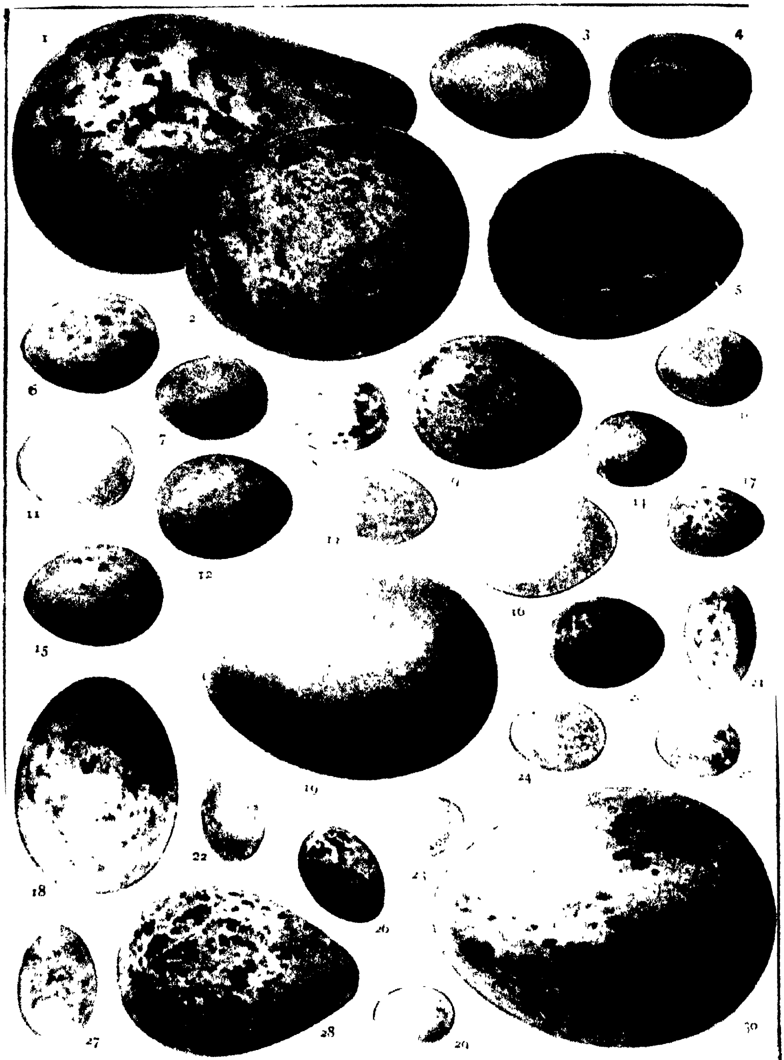
THE BOY'S COMPANION

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Frontispiece

THE BOY'S COMPANION

EDITED BY

B. WEBSTER SMITH
(*Centurions*)

BLACKIE & SON LIMITED
LONDON AND GLASGOW

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INTRODUCTION

Although Association football is Britain's national winter game, the number of people who really understand the technique and tactics of the game is surprisingly few. Should you doubt this, take note of what causes most cheering at the next big game you witness—possibly some useless long high kick, or a " whizz-bang " shot into the side net by a winger who ought to have crossed the ball, and was in no position to shoot at all.

In this short article I shall attempt to outline what is usually regarded as sound orthodox play and good tactics.

Most helpful of all, if you are a young player, is to try to see occasionally a really good League player playing in the same position in his team that you occupy in yours. Watch his positioning, and try to understand his moves—chiefly, of course, his co-operation with the team mates round about him. By so doing you can see a practical demonstration of good play and technique.

BOOTS

In buying boots you must remember that, in the long run, quality pays. Cheap, trashy boots are quite useless, and give neither the comfort nor the support necessary for strenuous play. Go for a reliable, well-known make, and choose a pair that fit " neatly ". Do not make the mistake of buying a pair that pinch your toes, in the belief that they will stretch; they will not stretch " longwise ", and if they are short when you buy them they will remain short. Good boots, properly cared for, will last a long, long time, and the following treatment will prove satisfactory in enabling you to get maximum wear and usefulness from your pair. (1) After play, brush them with a hard brush to remove mud and grass: an old knife will help to dislodge earth pressed hard round the studs. (2) Apply ordinary boot polish and shine them. (3) Periodically—perhaps once a month—grease the uppers with dubbin, and your boots should be comfortable, sound and strong.

The removal and renewal of studs causes perforation of the sole in due course, and a good plan is to use "tips" (see fig. 1). Using this system the original studs become—permanently—part of the boots, as a permanent "base" for studs. Using one nail, attach a "tip" to each stud soon after you obtain your boots. The one nail used does not penetrate the sole at all, and when a tip becomes worn it can easily be replaced. Many leading clubs use this method of preserving boots.

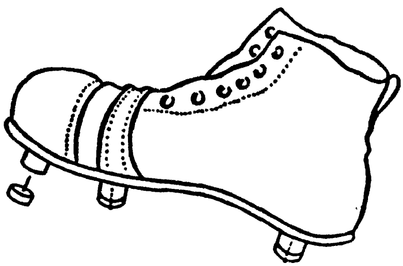


Fig. 1.—Boots—Tips to studs

One final point—a good player will not loan his boots for anyone else to use. No two people have feet exactly alike—so if you lend yours you are doing something unwise; they will not be exactly the same when you get them back!

THE BALL

Many boys make the mistake of trying to play with a ball that is too big and heavy for them. A size 5 ball is made for grown men to play with—for top-class amateur and professional players—who are powerfully built physically, and completely developed. In addition, they are able, through long and hard practice, to use their strength to the best advantage, and even then they find a wet, heavy size 5 takes a good deal of force to make it fly. Very few boys, up to the age of sixteen, are able to handle a full-sized ball properly, very few indeed. Much better play, and much more fun, too, would result if boys played with a boy's ball—a size 4. A good test is this—can you kick the ball, off the ground, from goal to midfield? If you cannot do so with comparative ease, then the ball is too big and too heavy for you, and you would have much more pleasure, and would play much better, with a size smaller.

Lacing.—To blow and lace a ball properly is an extremely difficult job for any boy to tackle. To do this well requires very strong fingers and much experience. But if you have any say in the preparation of a ball for a game, the following tips are useful:

(*a*) Do not have the ball blown as "hard as a brick". Such a

ball is not too pleasant to play with, and is almost impossible to lace properly. The ball used by all big clubs is always firm, of course, but it is never " brick hard ". You could always find a little " give " in the ball used in a league game if you pressed it with your thumb. So, remember, no erring on the hard side—if you slip up regarding the " firmness " of the ball let it be on the softer side.

(*b*) Now a word on lacing the ball. A leather thong or leather bootlace should never be used to lace a football. It is never used where top-grade players play, and the reason is obvious—it is dangerous. Imagine having to stop a fast-moving ball with your head—as you may often have to do—and being unlucky enough to head it on the lace—a leather lace. You would have a sore head for weeks! A good ball always arrives from the shop laced with a special " waxed " lace—often yellow in colour—and not unlike a football-boot lace. This is the ideal thing, but if you cannot get one, and they are hard to get, then why not do as all the best clubs do—use an ordinary football-boot lace. But leather laces in match footballs—*never.*

SHIN GUARDS

It is a mistaken idea to think that only weaklings wear shin guards. Far from it—all the best players in the game use this very sensible precaution. A pair of simple, sound shin guards will save you many annoying knocks, and you will soon become so used to wearing them that you will forget you have them on, even though at first they may feel rather strange. Of course, do not attempt to wear a man's guards if you are quite small—they will merely be a nuisance if they are too long, and a smaller pair suitable for boys will be found quite easily in any sports shop.

ATTITUDE ON THE FIELD

You must have seen players on the field who looked especially business-like. They have their kit on neatly, their hair brushed, their sleeves up, and in moving about the field, covering up, or taking up position, they impress you that they are " on the job " and alert. Such players usually are very much alive. A sloppy-looking player who slouches about the field is frequently just what he appears to be—an indefinite, " wishy-washy " player.

THE REFEREE

It is possible to learn something from all sorts of games, and we can learn a useful lesson from Rugby football in at least one aspect of Association football. This is in the players' attitude towards the referee: in Rugby it is usual—in fact, it is always done—for players to accept the referee's decision promptly and without question, no matter how harsh that decision may appear to be. Most unfortunately, there has crept into Association football, in some circles, the detestable habit of questioning the referee's decision. It has become, in fact, fashionable to "appeal" and even to show displeasure at decisions. This is the biggest blot on our grand game at the moment. Remember that the referee is devoting his whole attention to watching all points of play, that he is usually in a good position to see what is going on, and that his knowledge almost always exceeds that of the players. To question any decision of the referee is absolutely forbidden by the Laws of the game, and any player who does so is guilty, not only of breach of rules, but, much more important, perhaps, he shows complete lack of discipline, training and sportsmanship. No boy with any pride or spirit fails to accept all decisions with a good grace. The good name of your school, your club, and, of course, yourself, is in your hands, so do not let any slip-up in this matter of behaviour ever occur. It is correct to say that nothing does Association football so much harm as this "wrangling", and it is up to all of us who play to see that it is stamped out completely.

TEAM WORK

In all our major games team work counts above all else. In Association football more than in any other game, perhaps, is this true, and it is harmonious team play that brings success.

International matches seldom produce really sparkling football of the team-work variety; granted, you often see much individual cleverness. The reason for this absence of combined play is, of course, that the men selected come from clubs all over the country, and they are not used to each other's play. Nor can they learn all about their companions' weaknesses and strong points in the few hours they are together before an important game. Thus it is that a

good club side usually plays much "smoother" combined football than any number of brilliant men put together for one occasion. It is not really correct to call them a team—they are really a collection of individuals.

To enable your school or club eleven to attain this desirable quality known as "team work", certain things must be done. (*a*) You must endeavour to keep together, in the same positions, the same players for as many games as you can. Only by this method can they learn the style of play of their team mates. (*b*) Selfishness must be completely stamped out. Frequently I have heard very good players discussing play and players, and sometimes they say: "Yes, he is a very fine player, but he upsets the team." When I hear this sort of remark I always suspect that the player referred to is playing for himself first and for his team second. This attitude is absolutely hopeless; such players are only a nuisance, and have no place in any team. You may find sometimes then that a boy who is himself very clever indeed does not help the team work, and that a less showy or less clever lad fits in better with the other members of the eleven. There is only one sensible thing to do, of course—leave out the individualist and play your "team man".

You must never forget that this greatest of all games is, first, last, and all the time a team game. Individual play is of little consequence, and the selfish man—however able he may be—is of no use to a good side.

CHANGE IN TEAM POSITIONS DURING GAME

It happens far too often that the formation of a team is altered during a game for no real reason. You sometimes hear a boy, playing perhaps at outside right, say to his right half: "Do you want to play here for a change? I'd like a turn at right half." Not wishing to appear unfriendly the half back agrees, and they change positions. If this sort of thing creeps in, combined team work ceases to have any meaning at all.

The only real reason for changing positions is (*a*) if a boy is injured, or (*b*) if you are losing and think a change of "line up" might save the game.

In case (*a*) it is obvious that if, say, your centre half was injured, it would be folly to leave him hobbling about trying to cope with

his duties. If he is badly injured he ought to leave the field, so as not to do himself further harm. If only slightly hurt he should go to the extreme wing position, where he is not so much in the thick of it.

Take now case (*b*). If your teacher, or committee, or captain feels that a player in a vital position is having an "off day", and when you are losing as a consequence, it is often good policy to make a change, in the hope that by so doing you will upset your opponents. If, say, your team was playing quite well but getting no goals, you might find that your centre forward was too light for the defence opposed to him. Here it would probably pay to try what effect a hefty full back might have at centre forward; his more direct tactics might bring success, and such a change would therefore be sensible and justified.

But haphazard changing of positions during a game is bad policy, and will prove of no help at all. You will not see a good team change their formation, unless for one of the reasons given in (*a*) or (*b*).

GOLDEN RULES

Football is a game in which you must play *all the time*, and not only when you have the ball. In fact, you should do most of your playing when you have not got the ball. This may seem to be a strange thing to say, but the explanation is simple—if one of your team has the ball you ought to be moving towards an open space to receive the ball; if your opponents have the ball, your task is to mark your man so closely that he is useless to his own team as far as receiving a pass goes.

To repeat then, the golden rule is this: If your team have the ball—get to the open space; if the opposition have the ball mark your man!

Watch how in a really good team the players work on this "golden rule" all the time—they are never stationary, but always moving about as the situation demands.

Another very good plan is to keep your eye on the ball at all times. Some players have a foolish habit of turning their back on the ball—usually when running back to cover up when a free-kick has been given against them, or when a goal-kick has been awarded. Nobody can possibly see through the back of his head,

and many chances have been lost because attention was not fixed on the ball all the time. So another golden rule is, at all times, to " face the ball ".

Perhaps the most important rule of all is, " Play to the whistle ". Many opportunities have been thrown away, many games lost, because players stopped playing, expecting the whistle. This is fatal; the only reason for ceasing to play is because you are told to stop—and you can only be stopped by the referee's whistle. Never anticipate it. Play till you hear it—always.

KICKING

Two-footedness.—Before discussing the actual kicking of the ball, we must mention one thing—ability to kick with both feet. When next you see a really good team playing, watch how nearly all the men are " two-footed ". This is an asset which every player must endeavour to command. There is only one way to do it—use your weaker foot freely in play; only by this practice will it develop. What if you make mistakes whilst not too proficient? You will eventually—if you persevere—be twice the player you were—a boy who is a player " on both sides ". Some people advocate putting a slipper on your " good " foot, and going out with a ball—wearing a football boot, of course, on your " weak " foot—in the hope that you have to use the booted foot, as there is not much pleasure in kicking a ball with a slippered foot! This seems a boring job to me; why not say to yourself, when next you play, if the ball comes to your " dummy " foot you will use it. If you do, improvement is bound to come along. So, begin to use that leg you have only been standing on up till now—you will surprise yourself at the improvement in a few weeks.

Kicks.—There are many ways of kicking a football, but, roughly speaking, there are four fundamental kicks. Firstly, comes the *punt*. This is the type of kick used by goalkeepers taking goal-kicks, by full backs " clearing their lines ", taking offside kicks, and so on, and on all occasions when distance is required. The ball is hit " off the laces " with a fine, free, full follow-through. To obtain the height necessary for this kick, the ball is placed slightly in front of the " standing " foot (fig. 2).

Secondly, comes the *kick or shot for goal.* Remember that the fastest drive in the world, if it is 8 ft. 6 in. from the ground, is

harmless—so your attempts at goal must be "kept down". This is done by getting your body over the ball when hitting it. Note



Fig. 2.
Kicking—Punt

in the diagram (fig. 3) that the knee is well over the ball, and that the standing foot is well up to the ball. The chief fault in driving for goal is leaning back at the moment you hit the ball—this gives height, and is, of course, fatal to success. Again, in this kick, you hit the ball "off the laces", and your toe must be kept well down.



Thirdly is the *inside of the foot pass*, chiefly used by wing half backs in placing the ball to their forwards. This is a most accurate pass, and is more of a "push" than a kick. It is most useful up to 20–25 yards, and is easy to receive; so, properly done, it should be on the ground all the way. It was on this pass that many of the famous Scottish wing half backs founded their success.

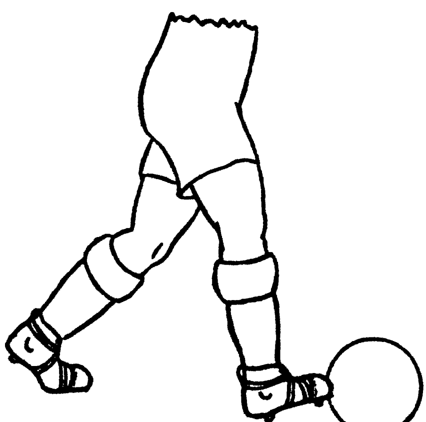


Fig. 4.—Toe kicking

Lastly, there is the *crossed ball from the wing into the goal area*. This differs from the other kicks described in that in the others the ball is kicked in the direction in which the player is facing, or moving: with the crossed ball this is not so—the ball is hit almost at right angles to the way in which the player is running. In this kick height is required, and the ball is hit "off the ball of the big toe" and lifted, so that it flies across, over the heads of intervening defenders, till it falls where it will do most damage—in the far side of the goal area. (There is a special paragraph in this article

on "Crossing for Goal", which you should read in conjunction with this description of the kick.)

There are many adaptations and variations of these kicks, but when next you see good-class players in action, see how often you can identify these "fundamental" ones. Remember there is no place in Association football—at any time—for toe kicking (fig. 4). There is neither power nor accuracy in this method, so avoid it completely; it is really bad! A famous international player once said that all "toe kickers" should be sent to jail for sixty days, and he was not far wrong!

HEADING

Most of the poor heading that we see in games is due to only one thing—fear. It is perfectly true that if the ball hits you on the head it will hurt—therefore you must not let the ball hit you. You must hit it! Good headers of a ball do three things usually: (1) they "go for" the ball—they hit it, and it certainly does not hit them; (2) they keep their eyes on the ball up till the last instant; and (3) they meet the ball with the forehead just where the hair begins. These three points cover it all! The whole reason for heading is to put the ball where you want to—and you do it with your head only because you cannot do so with your foot. Do not go putting your head down alongside your knees—to do so is quite foolish and dangerous. Always try to put the ball to one of your own team—there is no point in putting it just "anywhere"—that usually means giving it to an opponent!

One of the most dangerous balls for a goalkeeper is a "down header". Goalkeepers usually like to save high shots, just under the bar, for they find them quite simple—much the same way as a high catch in cricket is frequently easy to take. But the low ball always causes trouble—in cricket too, this is the case, and if you endeavour to head a ball *downwards* for goal you will score frequently. The ball which bounces on the goal line is always hard to stop—much more so than the high one just below the bar.

TRAPPING

Trapping is an art in which veteran players frequently excel, and many of these older players are able to compete most successfully with younger and more virile men largely because of their

great ability in this phase of the game. To "trap" really means, of course, to bring the ball under control, and this can be done in many ways. Normally, when we speak of trapping a ball, we refer to a ball coming in the air—the ball that is on the ground does not present the same problem at all.

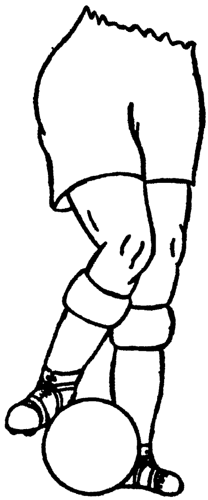


Fig. 5.—"Inside of foot" trap

The most commonly used and the safest method of trapping a ball is with the inside of the foot. As the ball meets the ground you bring the inside of the foot down on it, so as to wedge it between foot and ground (fig. 5). Do not hit the ball too hard in this procedure, or the effect will be to make it bounce forward out of control. Practice will enable you to gauge the "weight" required to bring the ball under complete control. Be late rather than early in meeting the ball, for, should you mistime it, the inside of the leg will very often "kill" the ball quite effectively. On the other hand, if you are too quick the ball will bounce away off your foot. Remember to get well over the ball—do not stand back and "nibble" at it. This method is the safest way of all of bringing a high ball under control—remember you are offering a large surface to the ball—the inside of the foot and also the lower leg. It can be used safely with a wet, "greasy" ball.



Fig. 6.—"Sole of foot" trap

The sole of the foot method of trapping is another popular method of killing a high ball. It is more spectacular, but not nearly so safe as the "inside of the foot" method. Here you wedge the ball between the sole of your foot and the ground at the moment the ball touches the field. Again, do not come down too hard on the ball—and again practice alone will tell you how much force to use. The sole of the foot trap is most

suitable for controlling a ball that has been not too high, and in dry conditions. It is very risky for inexperienced and young players if the ball is wet, or if it is coming from a great height. You see, the sole of the foot is quite a small surface to offer to the ball—mistiming is very easy (fig. 6).

DRIBBLING

Unfortunately most boys make too much of dribbling. To hold the ball and dribble just to show how clever you are is foolish, and it is a very slow way to beat a man; a well-placed pass is much more speedy.

The real use of dribbling is to enable you to progress with the ball to a position from which you can either pass to a colleague who is well placed, or perhaps you can shoot for goal yourself. Secondly, by dribbling, you can hold the ball—scarcely moving forward at all—till one of your team runs into an open space, when you will release the ball to him. But—it is worth repeating—to dribble just to show how clever you are is mere folly.

The most proficient dribblers in any team are usually the inside forwards; this is obviously just as it should be, for they are normally the men who manœuvre for position and make openings.

For defenders to dribble in their own goal area is not only risky—it is sheer stupidity. Do not be guilty of such practice.

TACKLING

The first essential in tackling is that the tackler should go in with the firm intention of getting the ball; there must be determination and earnestness, and no half-harted attitude will be of any use whatever. Do not think that tackling is a matter of height and weight only—some of the best and hardest tacklers in the game are small men—small in stature, that is, but big in heart.

The usual method of tackling is to place the foot firmly down in front of the ball, and by blocking it allow the forward who was running with it to overrun the ball. But, remember, you must " anchor " your foot firmly, so that a strong forward does not push you aside. So put your foot down firmly, and support it with your weight, and much determination. And you must " get in close " to tackle well: " fishing " for the ball with a long leg is quite useless.

It is a great help in tackling if you " cover your opponent into a corner ", thus limiting his movements. Full backs can frequently " squeeze " their winger up to the line, and can then tackle successfully when the wing man attempts to travel along the only " avenue " left to him, down the line.

A tackle seen frequently, and one which always causes argument and discussion, is the " sliding tackle ". This is the tackle in which the tackler slides low on one knee and attempts to play the ball with the other leg outstretched. This is an unsafe and unprofitable tackle usually, because the man making it finishes up on the ground. And there is no recovery from an unsuccessful sliding tackle because the man who is on the ground is of no use to his side. It is justifiable to use the sliding tackle if you are right on the touchline, and the winger against you is just pulling away from you. If, by going sliding in, you can push the ball into touch all is well, and the sliding tackle can then be of use, but its use in play infield is not good policy.

CROSSING FOR GOAL

One of the biggest weaknesses in present-day play—of all grades—is in crossing for goal. Far, far too many crosses land in the arms of the goalkeeper, or fall just behind goal. In both of these places

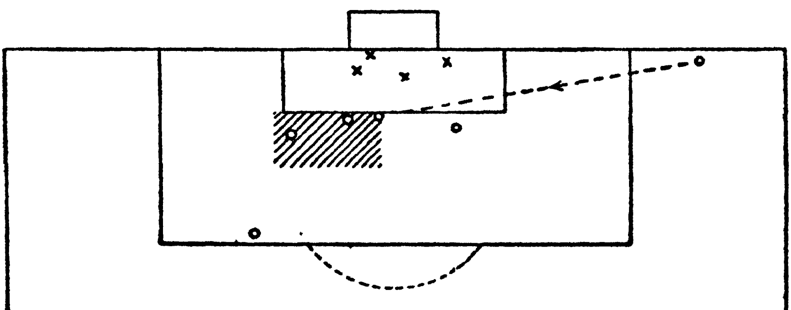


Fig. 7.—Cross for goal

they are completely useless. Unfortunately, many of these efforts are cheered to the echo by ignorant onlookers, and many young players are thereby encouraged to try the same thing again. A good cross should be out of the easy reach of the goalkeeper, towards the farther side of the goal, and should be head high about 8 to 10

yards out from goal. Notice what a really good winger does when he has the ball on the goal line, near the corner flag—he cuts it back this vital eight or ten yards (see fig. 7). It is obvious that the goalkeeper who dashes out some ten yards from his goal to intercept a cross is taking a grave risk—and he does look very, very foolish if he misses the cross and a forward heads it into an empty goal! But the winger who repeatedly crosses into the goalkeeper's hands is almost a *saboteur*—a good goalkeeper finds no trouble at all with these balls; in fact, he likes them very much, and they show him up in a very favourable light!

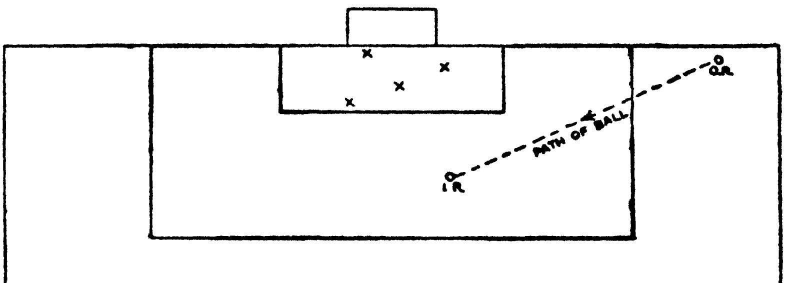


Fig. 8.—Cross for goal (ground pass as variation)

Similarly, the ball which lands behind goal—by however narrow a margin—is a ball thrown away. No inside forward has much time for the winger who makes a practice of dropping his crosses behind!

As a variation from the orthodox high cross, many good wingers, on occasion, drive a ball smartly back along the ground to a well-placed colleague, who can then attempt a first-time shot at goal. If you are playing on the wing it is worth trying this move once or twice in a game, especially if the defence seems well "lined up" to deal with the more normal high cross. Fig. 8 explains the move quite clearly.

THROW-IN

Far too frequently nothing at all is made of a throw-in. To waste a throw-in is to give away possession of the ball, a very foolish thing to do at any time.

A safe and very common method is to throw the ball to one of your team, who plays the ball back to you, and you are then in

a position to begin a move. Another good move is, if the left half is throwing in, for his inside right to dash across quickly, at the last moment, to receive the ball. By a quick last-minute dash he can probably shake off the man marking him, and should be free when the ball comes to him. The great thing to remember, if your team is throwing-in, is that it is foolish for your team to stand still. The men most likely to receive the ball should keep on the move, as they are much more difficult to cover when doing this than they are if they stand still.

But two things keep recurring concerning the throw-in, and firstly let us consider the chief one—the idea that the wing half back must take the throw-in. This belief is quite wrong, of course. From his position in the thick of things, it is usually the wing half who will throw the ball in, but young players must not run away with the idea that there is any *must* about it. The second belief, common amongst boys, is that you should not throw the ball in till all your opponents have covered up; it is a most ridiculous notion this, and one that is very difficult to understand. The game is meant to be played inside the touch lines, not outside, so, if the ball is out of play, and if it is your throw, get it—first man who can—and throw it in, and let's get on with the game.

This quick throw-in can frequently be done very effectively by an extreme winger. If on a lone dash he will sometimes find the full back will push the ball out of play, just over the line. Instead of waiting for his half back to come up—and he may be far down-field—the sensible winger will dash after the ball and throw it in quickly to one of his team mates. Usually he will throw to his centre forward or to his own inside man, as these are the players most likely to be " up " with him. A goal may frequently be snatched before the opposing defence is aware that the ball is back in play! This is completely fair, and is a good move, which requires quick thinking and good team-work.

A throw-in near your own goal-line is not often of much service to a team, but it can be put to good use. Occasionally it pays to throw the ball to your own goalkeeper, who can then punt far up-field, preferably towards the wing man on the far side, who will usually be found to be open. This paying move must not be over-done, as the opposing centre forward will begin to hustle the goalkeeper.

Few boys' teams know how to cover up at the throw-in against

them. Most first-class clubs endeavour to leave their full back free when the throw-in is being taken by their opponents. Assume, for illustration, that a team in black have a throw-in; it is being taken by their left half. The right half back of their opponents—the "white" team—leaves his inside forward, whom he marks in general play, and covers the black outside left. The white inside right comes

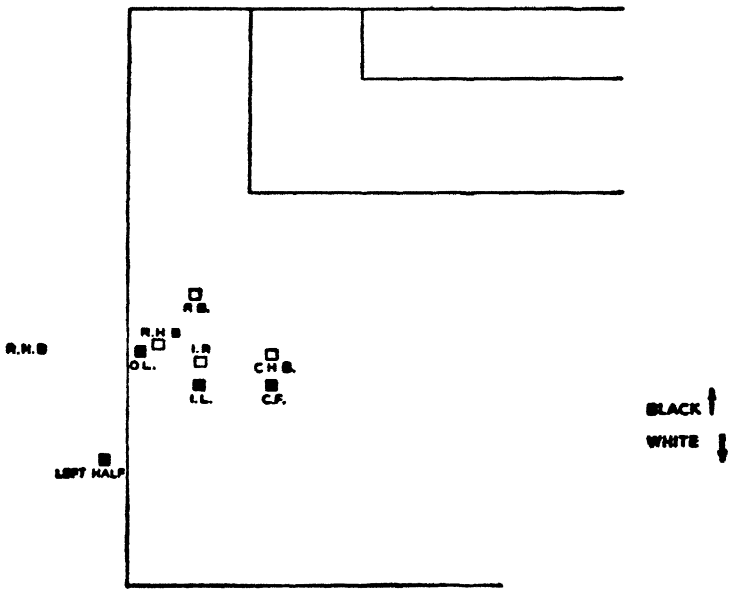


Fig. 9.—Throw-in: "free" full back

back swiftly to cover the black inside left, and this leaves the white full back free to intercept a throw down the touchline or one inside towards the goal area. (Fig. 9 explains the position.) You will be surprised, even in top company, at how many throws the "free" full back returns upfield! If the full back were to cover the winger—as in normal play—a long throw over their heads would find the full back running towards his own goal chasing the ball, and very likely losing the race to a fast winger. And you will remember that the winger is running in the direction in which he wants to go!

OFFSIDE

There is more misunderstanding and argument perhaps abou offside than about anything else in Association football, and th main point that matters is frequently not grasped at all. Briefly, th crux of the matter is this—it does not matter at all where you ar when you get the ball; what does matter is your position when th ball was last played. If, when the ball was last played, you had two opponents between you and the opponents' goal-line, then you are onside, even if you have run into an apparently offside position when you made contact with the ball. Unfortunately, many clever players score good goals and have them turned down because the referee is not always able to note that they dashed in (from being in an onside position when the ball was last played), and the goal has been disallowed because they appeared to be in an offside position when they actually played the ball, to score. Top-class referees, however, are not slow to observe this, and you must have seen defenders looking very foolish indeed if they had expected an offside decision because a forward looked to be offside, when, in fact, he had dashed in quickly from an onside position.

And do remember that you cannot be offside at a throw-in, goal kick or corner kick.

GOALKEEPING

The rule for goalkeepers must always be "safety first". A mistake anywhere else on the field can be covered nearly always, but if the keeper slips up the result is usually disastrous.

When at all possible, the body should be behind the ball, and you will notice, if you have the opportunity of watching a really good man, that he always seems to pull the ball in towards his body—this is a sound and very safe practice.

In all well-run teams the goalkeeper is regarded as being "in charge" in his own penalty area, and if he calls for a ball it is always left to him. The reason is obvious—he is facing the play at all times, and can see how everyone—"friend" and "foe"—is placed. No other defender is so well situated. So, if you are goalkeeper, you must learn to command your penalty area.

Most boys who keep goal are troubled by the crossed ball; to

come out or not to come out—that is the question! The best solution is to ask yourself, very, very quickly, of course: "Am I sure I can get it?" If so, go out for it. If you are in any doubt, stay "at home". But do not go half-way and then stop.

The goalkeeper who places his clearances to advantage is a great asset to his team. The safe working rule here is—if the ball comes to you from your opponents' left wing, clear towards your own left

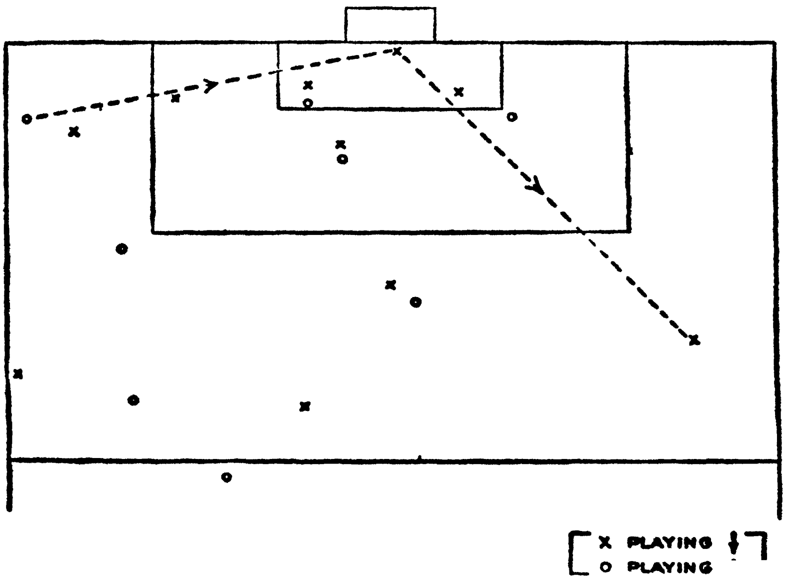


Fig. 10.—Goalkeeper placing clearance to "open" wing

wing; if it comes to you from their right wing clear towards your right wing. You will find, very, very often, that by playing the ball out in the direction outlined above, you will find one of your own men—the winger usually—quite unmarked.

You may notice, watching a good man in goal, that he frequently gives the opposing forwards "nothing to aim for": by astute positioning he covers his "target" so well that the advancing forward either bangs the ball straight at him, or else misses the goal completely by trying to place the ball past him. This "angling" can only be learned by constant practice in games, but it will help very much, at first especially, if you can manage to see a league keeper

opposition, and return the ball to his forwards. If the opposing defence clear a ball over the back's head, the centre half can cut out and intercept it. In the unusual event of the clearance going over the centre half's head, too, the left full back would dash across the field to remove the danger. It is clear that, if full backs and centre half played " square " across the field, a long ball could beat all three; with a defence playing in " three depths " this is not at all likely.

You frequently read in the Press that " with his goalkeeper out of goal the full back cleared on the goal line ". This is not good luck only, it is usually good defensive covering up, for when your keeper goes out to intercept a cross or corner kick your full back should double round behind him to avert danger should he miss the ball.

It should be obvious that all full backs *must* be fearless, strong tacklers. For this reason a stout physique is very helpful, but it does not mean that a small man or boy will not be a good back—many small players have been grand backs—but it is helpful to have height and weight, both of which are most useful when allied to a stout heart.

CENTRE HALF BACK

The change in the offside law in 1925 brought into the game the tactic known as the " third-back game ", and all the big clubs now play a defensive centre half. Many people are not in favour of this type of play—they say it is negative and destructive, but it does appear that modern conditions make it necessary. It is indeed difficult to recall any club in the last twenty years that has achieved success without using the purely defensive centre half back.

The first duty of the centre half back is to " police " the opposing centre forward, the " scoring " man, and to see that he does no damage. This can be a most exacting task.

The modern centre half must be good in the air. So much of his work is heading that any boy whose headwork is not strong must give up all ideas of being a centre half. To be effective, the centre half must be master in the air. Watch, in this connection, how the really good centre half endeavours always to place the ball with his head to one of his team mates—to his wing half backs usually—so that they may use the ball to begin an attacking move.

Co-operation between the centre half and the full backs has

already been mentioned (see paragraph on full-back play). To repeat, the centre half is the pivot round whom the full backs move; attacking on your left wing, your left full back follows up, and the right back becomes your last line of defence; apart from the goal-keeper, of course.

Though classed as a defender, the centre half can begin many attacks by crisp, sharp passes to his wing half backs, or to his inside forwards. Cullis, of Wolverhampton and England, was extremely good at this, and many of his team's goals could be traced to a strong tackle by Cullis, followed by a 20-yard pass to one of his inside forwards or wing half backs.

Of all players perhaps, it is most essential that the centre half be two-footed; if you consider the nature of his duties this becomes obvious. He has to tackle on either side of himself, to clear to left and right, to pass to his left half now, his right half the moment afterwards. A one-footed centre half is very soon found out, and opponents soon learn which is his weak foot and, of course, they play on this " dummy " side.

WING HALF BACK

This is perhaps the most exacting place to play in any team. The good wing half must be strong in the tackle, good on the ball, and quick " off his mark ". Whatever the state of the game, he rarely enjoys any rest, for if he is not defending his own goal he will be assisting to attack his opponents'.

In modern play the wing half is responsible for marking the opposing inside forward. It is clear that if an inside forward is so closely covered that he has no room to feed his winger with well-judged passes, the winger will not figure very prominently in the game. And so it proves—a plucky, " hardy " wing half who sticks close to the inside man opposed to him when his (the wing half's) team is defending, goes far to ensuring his team's success. If any good full back tells you that his wing half is " fine to play behind ", you can be sure that he means that his wing half is so conscientious in covering the inside forward that few really good passes come through to the winger. The full back's job is therefore made very simple—hence his opinion of his wing half!

On the attack, the wing half has two men dependent upon him —chiefly, that is, for their supply of the ball—his outside forward

and inside man. To feed his inside forward he must cultivate the accurate ground pass with the inside of the foot (see p. 24).

A good wing half, when his wing is carrying the ball far into the " enemy's " territory, does not stand and survey their movements from afar off—remember the poor wing half has no rest! His job, then, is to follow up his wing—some 20 to 25 yards behind them if possible. From this position, it is frequently the wing half who crosses into goal—when his winger is " stuck " and runs the ball back to him. The next time you see a really good team in action, you will see this very clearly shown; and note how often the wing half is able to assist his forwards by being just behind them.

The *throw-in* is normally part of the wing half's duty, and this is described in the section on " Throw-in ".

A most useful pass, used by good wing half backs, is the short cross-field ball to the other wing half or inside forward (i.e. from right half to left half or inside left). This has the effect of changing the whole " front " of attack, and is most confusing to opposing defences who expect an attack to be made on one flank, and take up position to meet it: they are therefore very upset and troubled when the attack switches to the other wing—frequently with disastrous results for them.

By following up his forwards, a wing half frequently has the opportunity for a quick shot at goal; this usually comes from a short clearance from the opposing defence, or it may be the outcome of a pass back from his forwards. The half back who can hit these balls hard and true for goal will score many vital goals.

CENTRE FORWARD

To play centre forward in modern football, a boy—or man—requires to possess certain very distinct characteristics.

He must have considerable courage, as he is the leader of nearly all attacks into enemy territory, defended, remember, as it always is, by burly full backs and a centre half who is determined that the centre forward shall do no damage. It is obvious that a timid player is quite useless in the centre forward position.

A boy, to succeed at centre forward, must be strong in heading. He must be able to jump for the ball, and, having jumped, must be able to place his header in the direction he desires. Usually he will

attempt to head a cross away from the goalkeeper towards the side of the goal.

The ability to kick for goal hard with both feet must also be considered an essential thing in boys who are keen to be centre forwards. With present-day tactics—a centre half who " polices " the centre forward—the slightest chance must be seized upon, and there is never time to change the ball to your " good " foot. You must have two good feet to be a success in the middle.

Part of a centre forward's duty is to keep play " flowing " in his forward line, and he must take every chance possible to send

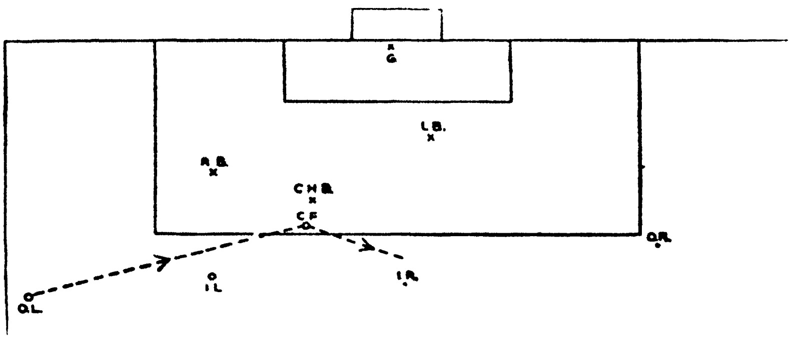


Fig. 12.—Centre forward. Header back to inside forward

long, far-flung passes out to his wingers. This is perhaps the speediest way to make ground. If you see a good centre forward playing you will notice that he frequently transfers play quickly from one side of the field to his opposite winger (i.e. from out on his left to outside right) by a long cross pass. This is really dangerous, as the winger will usually be unmarked.

The man who remains in one position is easily covered, so it is good policy for a centre forward to move about freely. When this is done the task of the centre half marking him is made much more difficult and tiring. So, if you are centre forward in your school team or club eleven, move about: the man covering you will not like it, but it will pay your team and yourself.

Frequently you will see young centre forwards head for goal from very far out—from the penalty line sometimes! This is quite foolish, of course, as very few goalkeepers will miss a header from that range.

The best move in this circumstance is to nod the ball down to one of your inside men, who should be following up quickly, awaiting just such a chance to shoot for goal (fig. 12). Similarly, if you simply cannot see a chance to shoot for goal, especially if you are at an acute angle, the best move is a short ground pass back to your inside men coming up to assist you. Such a ball coming back to an inside forward is easy to hit really hard, and many grand goals have come from this manœuvre.

INSIDE FORWARD

The inside forward shares with the wing half the honour of being the man who does most running about during a game. And there is perhaps no position on the field which can influence play quite so much.

The primary duty of an inside forward is to make openings, and particularly to see that he keeps his wing man well supplied with the ball. When you remember that the inside forward is usually closely marked by the wing half back you will understand that it is by no means easy to keep sending well-judged passes along to the wing man.

Another pass which expert " inside " men use frequently is the " down-the-middle " pass. This is a ball placed between the full backs, to pass the centre half, for the centre forward to run on to. To do this well requires fine judgment, but it is a most telling pass when properly done and frequently leads to a goal (fig. 13).

Too few inside forwards to-day are able to hit a really fast ball for goal—much more often than not we see weak " lobbing " kicks for goal, or shots with no punch in them. But an even more common fault is to see inside men, actually in their opponents' penalty area, juggling about instead of shooting hard for goal. And one important thing—if you find your shots are being charged down by defenders, then you are holding on too long. Hit hard from the 18 yards' line is a very sound motto—and the more often the better.

It is surprising how few inside men, having lost the ball, will fight back. This is especially bad if you are dispossessed by the wing half covering you. If you allow him to go ahead and do not go after him, your own wing half will be in an awkward predicament. As inside forward you must chase the opposing wing half if he is in

possession. If you do not get the ball you will at least make him pass hurriedly or at a disadvantage, and it will not be so accurate as it might have been had you merely stood looking on. At inside forward you must fight back.

Good ball control is absolutely essential if you mean to succeed at inside forward. In fact, in all classes of football, it is usually the

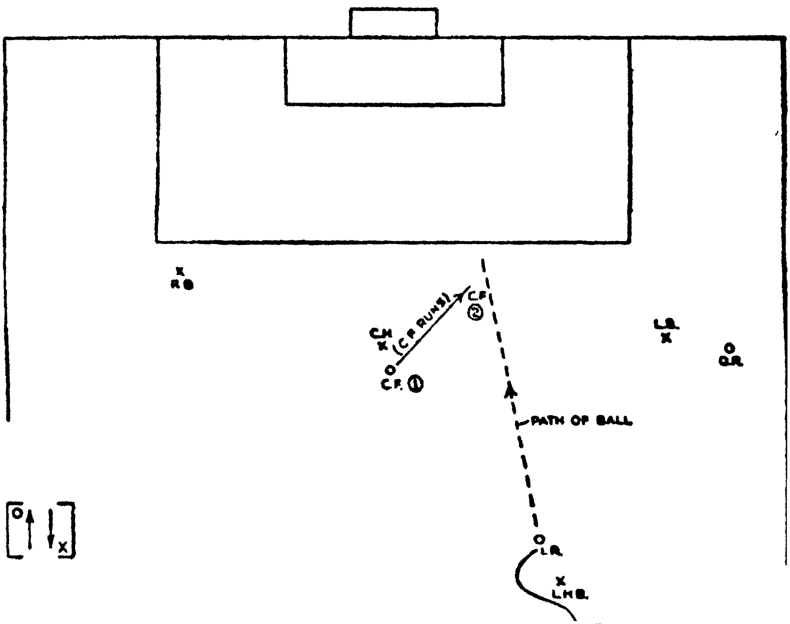


Fig. 13.—" Down the middle " pass to centre forward (from inside forward)

inside forwards who are the best " ball players ". But frequently they dribble needlessly when a well-directed pass would be more advantageous. To dribble round a man, you know, is a slow way to beat him—a well-directed pass is much more speedy.

Speed " off the mark " helps many good inside men to avoid tackles, and in practice play you must try—by a burst of sheer pace—to be past a would-be tackler before he can move. It is quickness over these first few yards that gets you out of trouble!

WING FORWARD PLAY

In football to-day it is desirable that wing forwards be fast. Much danger occurs if you have a man whose pace will take him clear of the defence—and especially if you have inside men who can "feed" such a speedy wing. During their very best period, some years ago, Arsenal relied greatly on the sprinting powers of Hulme at outside forward, and there are many similar cases of men of great speed being very dangerous wingers.

Besides speed, the ability to cross the ball accurately is of vital importance. The winger who can place the ball regularly in the danger area (see paragraph on "Crossing for Goal") is a very great asset to any team. And if he can cross with both feet so much the better. There is nothing quite so pathetic as to see the right winger who has been forced to turn back to his own goal and who cannot cross with his left foot. All top-class wingers can swing the ball in comfortably with either foot.

If you play on the wing you must develop an understanding with your inside forward, and only playing together will achieve this. One of the biggest joys in the game is to see a good wing pair moving downfield inter-passing in perfect understanding. Try to play the same men together on the wing as often as possible—this alone gives understanding.

If you play on the wing there are one or two unforgivable sins. One of these is to cut in towards goal and then shoot past the near post into the side net. This has a most upsetting effect on your other forwards who are dashing in eager to help. The target when you cut in should—normally—be just inside the far post. Your shot has then three chances: (*a*) it may go where you wanted it and be a goal, (*b*) it may be saved by the keeper—at full stretch and be pushed out to one of your onrushing team mates (this happens very often), or (*c*) it may be out from goal, when it becomes really a fast cross. But the ball into the near side net is a ball thrown away!

A winger's place in ordinary play is some five yards in from the touch-line: by keeping well out on the wing like this you not only give your own inside man much more room to work, but you also draw a defender out from his goal area to keep an eye on you. When your winger on the other side of the field from you is centering

the ball you move well in, of course, and you will frequently be able to try for goal from a long cross which may well pass over your centre forward's head.

Many boys seem to think it is an admission of weakness to enlist the aid of their own team mates—especially if it means passing back. This is a foolish notion, and quite a wrong one. A good winger frequently draws the full back to him, then slips the ball backwards,

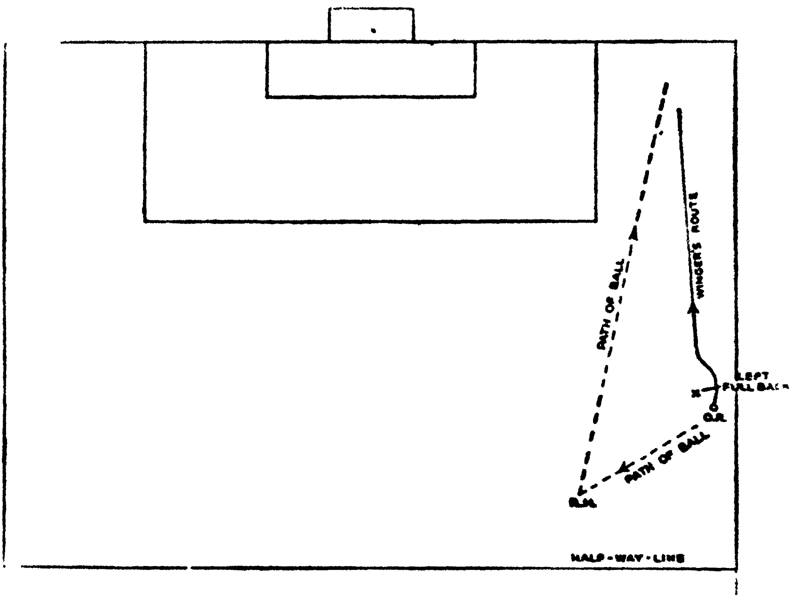


Fig. 14.—Wing forward. Ball from winger back to half back and pass from wing half (to beat full back) to winger

inside to his wing half; the wing half at once places the ball back in front of the wing man, who has run forward anticipating the move, and the poor full back has been beaten without even having had a chance to tackle (fig. 14).

As in the case of the inside forward, so with the winger—if you lose the ball you must not stop—go after it. The full back who robs you and is left to place his clearance in his own good time will cause your defence much trouble, so do not allow him to take it easy. If he gets the ball from you go after him and make him clear hurriedly; and a hasty clearance is seldom a very good one. So—no rest or peace for the clearing full back!

tell you. Slip your trousers or track pants and sweater off just before the race or practice, and put them on again as soon as it is over. Nothing kills a man's energy quicker than cold.

One must have a pair of soft and trusted shoes for racing purposes. See that they are sufficiently tight to be certain that they will not come off. The length and number of spikes is somewhat a matter of individual preference, but sprinters in general should have at least four ⅜-in. spikes in the sole and one on the toe; for longer distances, where the runner comes down more on the flat of the foot, a couple more spikes are desirable. Do not walk in spikes on hard surfaces, but go to and from the track in a second pair of shoes. If you have the misfortune to be " spiked ", take expert advice as soon as you can; I once suffered six weeks' misery because a punctured foot became poisoned. Hurdlers or jumpers should have either an ankle strap or a strip of elastic, wide but firmly fitting, over the instep. Jumpers also need a rubber pad in the heel to break the jar when coming down.

Your vest and shorts must allow absolute freedom of movement; some athletes prefer buckled shorts or safety-pins to an elastic waistband, for this reason.

Sprinters need a trowel for digging themselves a take-off hole.

Two points to be borne in mind, about training and racing alike, apply whether you sprint, run a mile, walk a mile, hurdle or jump. The first is, Balance, spelt with a capital B. The more perfectly one is balanced, the easier it is to get along. Some athletes possess a good balance naturally, others acquire it only after much practice; but it really is essential to feel that, as you go forward, you go forward *only*, and do not sway or swerve from side to side. The slightest swerve means of course that the runner is off the straight path, and this may mean a yard or two lost, and with it the race. The second point is, learn to get your feet off the ground. Nobody can win any race without speed, and the essence of speed (one's balance apart) is to pick up the feet quickly. This again only comes with practice. Go to a first-class sports meeting and watch how the star performers move their feet.

In long runs across country, and especially in sharp walks, you may get shin soreness; the cure is to keep on, when gradually it will die down. Stitch, on the other hand, can only be dealt with by slowing down; by taking things easy for a spell the symptoms should pass. As to cramp, youngsters ought not to get it; but if it does

happen, the victim should be laid down flat, the limb extended, and massage applied.

Club or team spirit is the essence of all amateur athletics. Although every man runs for himself, and hopes to win (in his secret heart), he also competes for his team. If, therefore, in a long run or walk you find yourself falling behind, do not despair; you may not be in the scoring three of your side, but you may help to keep back the third member of some other team. Whatever happens, too, always fight the race out to the end. If you are entered in a handicap, and you feel that your start has been unjustly cut down, do not volubly protest. Handicappers have a difficult job, and you must credit them with trying to be just; sooner or later, too, the handicap will favour you if you run often enough.

Finally, if your school is a big one, and you have a sports master or trainer, obey his behests even though the reasons for them may not be apparent to you. He is the man on the bridge, who knows (or should know) what is best for his crew.

One more word about competitive athletics, and I have done. Nearly every track differs somewhat from others, so that it is prudent to learn as much as possible beforehand about the track on which you are to compete. Similarly, if you can get knowledge or experience beforehand of the men against whom you are to run, such knowledge may prove half the battle on the day of trial. All races except sprints are won quite as much with the head as with the feet!

SPRINTING

The sprint allows the athlete no time to think. He has to run as fast as he can for as long as he can, and that means that his action must as nearly as possible be mechanically perfect. He is therefore compelled to practise the few things that he has to do in action, again and again, until they are automatic.

Most 100-yard sprints are lost at the start; therefore you cannot pay too much attention to starting correctly, but even if you practise starts daily on the track, and watch other who are expert, it will be a long time before you achieve that complete balance and evenly increasing momentum which constitute the perfect start.

To-day the " crouch start " is universal. As your hands have to touch the starting line, your foremost foot must be a few inches behind it. Having found where the toe will go without too great

a tendency to fall on your face, dig a hole with the trowel; this hole should have a sloping front and a carefully packed back, the back being vertical and at right angles to the direction of running; if it is not square the backward thrust will tend to turn you to one side. Placing the front foot in this hole, now drop on the other knee, thumb and index finger of each hand touching the line, and the lower knee alongside the instep of the front foot. Where your rear toe rests you should now dig the second hole, taking great care to keep its back square and firm. You then stand back until the starter calls you to attention, with the command, " On your marks ". Now take up you position, using the prepared holes, with the rear knee on the ground as before; and be certain that you feel well balanced, with no tendency to roll over sideways. On the words, " Get set ", you rise to a crouch, when all the unbalanced runners betray the fact by tending to fall on their faces. You raise the knee off the ground; your back should be horizontal, head still well down—forget that you have a neck! —and eyes focussed at the spot on the track, two or three yards ahead, where you intend to make your first step (fig. 1). Waiting for the pistol is a sore trial, but do not try to " beat " it, or in a serious event the starter may put you back a yard or two for your pains. Crack! you are off. At all costs you must resist the tendency to rise too soon or too far. The body should always be bent forward in sprinting, to such an angle that you would just fall over if you were not running. In the crouch start, one rises to that angle gradually—slides into one's stride, as it were—and thus obtains the greatest possible starting momentum. It is absolutely vital to run straight. If you find yourself swerving, you must practise again and again, keeping your eyes on marked points along the track, or (which amounts to the same thing) running on a chalk line. The slightest swerve at the start will cost you yards later on. After twenty yards or so, when you have been going for two or three seconds, you should be in your full stride (fig. 2). Keep the arms well in, thrashing

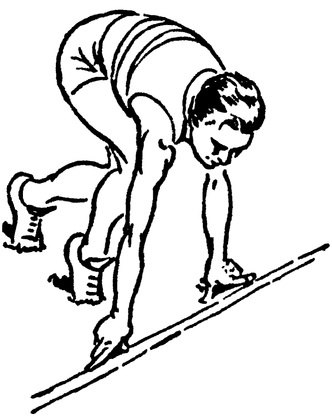


Fig. 1

backwards and forwards, and only slightly inwards across the body, and of course in absolute unison with your feet; it is this unison which more than anything helps your balance. The hands are involuntarily clenched; but whether one does this unaided, or by gripping a cork, does not matter very much.

At this stage of the race you will find the benefit of having practised deep breathing; indeed, you should not in ten or eleven seconds require more than a couple of breaths in all. The pace seems to grow hotter; at the start you were well away, but somebody has overhauled you, and though you must not look aside you know that he is in front. You have to make a supreme effort, with only ten yards to go. Your nervous energy will give you that little burst of speed; but you must still not raise your head. Don't slow down, as so many youngsters tend to do on approaching the tape; run right through it for at least six or eight yards at full speed, and then slow down gradually. In a close finish one can sometimes gain the verdict by throwing one's chest forward, or almost falling on the tape.



Fig. 2

Similar remarks apply in general to the 220-yard race, except that you are striding for a longer distance and must therefore keep a little in hand for the final sprint; also, of course, there is a bend to negotiate, as a rule, so that you start *en echelon* to allow for the disadvantage of being on the outside, and you will probably feel very much alone at the start.

One other point about sprinting, which does not apply to distance races. Never mind about the watch. You have to run all the time as fast as you can; you cannot do better than that, and the knowledge of times may disappoint you. It is far more important for novices to sprint correctly than to sprint fast; speed will follow later.

Good sprinters are born, not made; but training makes them into champions. If you show talent, you will frequently be asked to

compete in other events. This flatters one's vanity, but is not good for one's sprinting. After a fellow has run in perhaps two or even three heats, in order to reach the final of the 100 yards, it is sheer folly to sap his strength still more by taking on, say, a quarter-mile. In any event, for sprinters to compete in the quarter or over any longer distance is to ask them to exercise judgment of pace, the very thing of which, as sprinters pure and simple, they should be quite unconscious. The moment you think, you begin to slow down. Therefore, I advise natural sprinters to stick to the 100 yards and 220.

QUARTER AND HALF MILES

These two events call for three things, in addition to a pace but little inferior to that of the true sprinter—knowledge of the opposition, judgment of one's own pace, and stamina.

Training for the quarter-mile should begin by learning to run 600 yards; it accustoms you to the distance, and should help you to estimate just how much you must keep in hand during the actual race. Quarter-milers usually make a crouch start, at which they should be just as proficient as the pure sprinter, and for this reason. Unless the race is run in lanes, it is a tremendous advantage to get on the inside bend first, and once there, to try to hold one's lead; you can only achieve this from an outside position if you can start faster than the other fellows, and leap into the lead with a clear two yards ahead of the man whose track you intend to cross. After the first bend, the field will settle into its stride—preferably a long, swinging stride, throwing the foot out well and making every effort to "steal" an extra inch or two when putting it down. The arms should be held naturally, and should thrash backwards and forwards in synchronism with your strides. The stance should be slightly more erect than for a sprint, but the eyes must be "glued" on the track a few yards ahead (depending on your height), and you should never under any circumstances either throw your head up or look round to see what someone else is doing. To increase speed during training, get a sprinting friend to run 250 to 300 yards with you, as hard as you can go.

In this, as in all distance races, it will be invaluable to have someone to time you over the four legs of the course. In general, you may expect to find the second leg about half a second slower than the

first, and the third leg half a second slower than the second; how fast you run the last leg depends on all sorts of things and is quite unpredictable! Many quarter-miles are won by men who keep up to the shoulder of the leader during the first 300 yards, then challenge him before the final bend; if he be passed, the advantage is usually decisive, but if not, the challenger is no worse off than he was before and still has a faint chance in the run home down the final straight. Unless a runner has exceptional stamina and pace for the finish, he cannot overtake when on the outside of the final bend by making good the lost distance in the rush for the tape. As in pure sprints, quarter-milers must run right through the tape, and should slow up gradually thereafter.

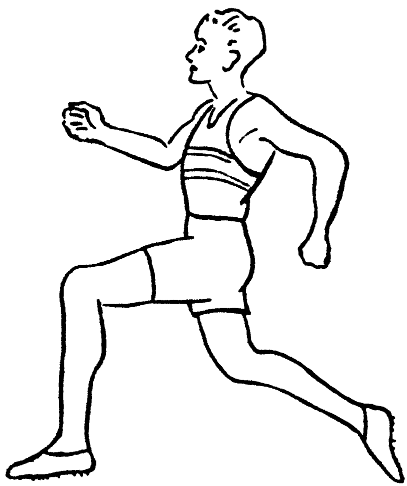


Fig. 3

Of course, if you know what opposition you have to face, and can judge your own time, you can plan a campaign to suit; but in practice many such plans have come to grief, and the only real way to win is to run fast enough. The general rules are, get in front at the start if possible (so as to hold the inside bend), do not try to pass on a bend, do not sprint for the finish until you are on or past the last bend, and do not slacken up in the (often mistaken) idea that you have a good lead. Most important, do not run wide when rounding corners, particularly at the last one.

The half-miler is often also a first-rate miler, but rarely a pure sprinter. Far more than the quarter-miler, he has to use judgment, even to the extent of hanging back a little (not too much) during the first lap. The long, raking stride pays best, and it is sound policy in most cases to let someone else make the pace for half the distance. If you are in front at that stage you will naturally cling tight to the inside bend; if only a few yards behind, you should try *steadily* to bring the leaders back during the first and second legs of the last lap, challenge for the lead during the third straight, and if you do gain

the inside bend at the last turn, keep up the pace till the last gasp. The half-mile, like some walks at intermediate distances, is indeed a most difficult and exacting race.

THE MILE

The mile, which is usually *the* event of an athletic meeting, calls for judgment and stamina rather than speed. It cannot be run altogether to schedule, unless you know the best performance of which every competitor is capable; and in the actual race quick thinking is needed, to decide what to do when your own position in relation to that of the other leaders becomes critical. Except for absolute masters, there are one or two sound rules for milers: do not take the lead yourself, but keep among the leaders for at least two laps; move up into second or third place during the third lap; challenge when about 250 yards from home, and then run like the deuce till you get there.

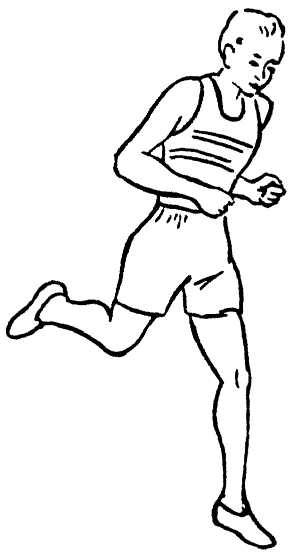


Fig. 4

Training for a mile demands long preparation. To be quick off the mark is no great advantage, but to keep an even pace is vital. You should therefore pay great attention to balance, the piston-like action of the arms, as little back-lift of the rear leg as possible, and keeping the attention riveted on the track ahead as you run (fig. 4). To acquire stamina, walk three or four miles as hard as you can, preferably with an expert. Run a couple of miles on the road, not too fast, but aiming at steadiness and balance all the time. Then go on the track and be timed over the four quarters, until you know almost instinctively just how hard you dare go. You may cover the first lap in 62 or 63 seconds, but the next will be up to 10 seconds slower, and the third lap possibly 10 seconds slower than that; the excitement and struggle of the last lap will speed you up again, to give perhaps 65 seconds, making a 4.40 mile. Fast milers, of more

mature years and experience, can of course do much better; youngsters need not be ashamed of slower times. Fast and slow alike, however, these proportions hold for most mile races: the first lap is the fastest and the third is the slowest.

In this event, even more than in the shorter ones, the value of deep, even breathing soon becomes obvious; so do not neglect your breathing exercises.

Nobody under the age of 17 should attempt to run a race of more than one mile on the track.

THE RELAY

Relay racing, by averaging out the performances of fast and more moderate runners, gives all a chance to display their prowess and team spirit, besides providing the spectators with what is often the best thrill of the meeting. It requires very careful attention to detail, however, and much practice, if the team is to achieve any measure of success. The necessary speed in running being taken for granted, the most essential points of relay racing are three: to get off the mark as fast as you can; so to hold the baton that the next man can take it with the absolute minimum of delay; and (if you are one of those who take over) to grasp the baton from the arriving runner without fumbling it, and at the same time get as quickly as possible into your own full stride. It is in the last two points that so many relay enthusiasts come adrift.

Let us study the action in a typical relay race of 440 yards with four runners, each of whom covers 110 yards. Normally, this will be run round a quarter-mile track, hence the teams should run *en echelon* and in lanes, for the handicap of an outside man whose team have to negotiate the outer curve of four bends is overwhelming.

It has to be decided who shall run first. Some authorities favour placing the fastest man last, and the second fastest first; but the author prefers placing the fastest man first and the second fastest last, regarding it as a great psychological advantage if a lead can be built up early in the race. This point is perhaps not so very important in a 4 by 110-yards race, but in a 4 by 220, and still more in a 4 by 440-yards, it requires close thought. Not only are the rear men oppressed by the sense of being several yards behind, but more time is allowed for correction of any accidental fumbling in the take-over.

Having decided the order of running, the first man gets on his mark, crouch start. A good way to hold the baton is between the thumb and crooked forefinger, towards one end, the baton pointing forward. It should be in the left hand. By doing this, you can still maintain your balance at the words, " Get set ". On the word " Go " you spring forward, running essentially as if you were doing one hundred yards, but with the mental reservation that you must cover 120 yards. Try to forget all about the baton, but *don't drop it*!

Your team mate, No. 2 of the relay, is waiting for you ten yards

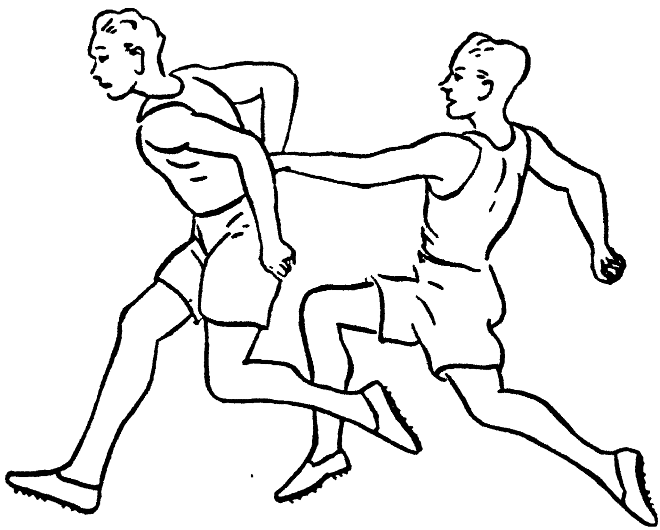


Fig. 5

on the near side of the 110-yard mark. He has 20 yards in which to take over, ten behind and ten in front of the distance. In those 20 yards he must get up speed somehow, without checking you too much and without fumbling the baton. It is essential that you should both run straight. The waiting runner should be on the inside as a rule, so that he can take over with his right hand; but if he is naturally left-handed the action is simpler. Most people, however, clutch more securely with the right hand. No. 2 must have run with you in relays before, and you should have practised together sufficiently before the race to know each other's style and pace to a nicety. Judging the right moment as you approach, No. 2 begins to move,

his right hand stretched out behind him, with the palm open, downwards, and thumb well away. As you draw close to him, so judge it that the swing of your arm brings the baton forward and up into his palm. As you sense that he has a firm grip, release your own, but continue running for a few yards longer. Neither of you should move his head, nor should No. 2 be looking back; he must know just where you are likely to approach, a thing only achieved by practice.

No. 2 now has to think of No. 3 as he speeds on, endeavouring to improve any lead which you may have given him. When he grasped the baton (presumably in his right hand), the greater part of it was behind his grip. He should immediately, in his first strides, swing it over to the left side, grasping the free end with his left hand; this again leaves the forward portion of the baton free, and ready for No. 3 to grasp in turn. Similarly, of course, with the third and fourth men. Nothing is more effective than a good change-over, or more disastrous than a bad fumble. Change-overs should therefore be practised constantly for this event, at slow or moderate speeds, until the two competitors know each other's ways automatically and exchange the stick almost without knowing it.

Of course, in the longer relays, such as four men to the mile, there is ample scope for judgment in running, but the 4 by 110 is purely a sprint event and each man in it must run his hardest every second of the time.

HURDLES

If the relay race is the most thrilling at a meeting, the hurdles is undoubtedly the most spectacular and graceful. It is also the most difficult, requiring not only the closest attention to every detail, but a flexibility of limb equalling that of a ballet dancer. We will confine our remarks here to the shortest of the hurdle races, the 120 yards. This is run on the straight and preferably also on the track. For boys the hurdles should not exceed 3 feet in height. The standard distance is 10 yards between hurdles, there being ten in all, with a run-up of 15 yards and a similar run home. For youngsters, however, it is recommended to keep the hurdles only 9 yards apart, which means that the run-up and run home will each be 4½ yards longer. The top bar of the hurdle should be painted white.

The beginner at hurdling must realize that hurdles are not to be taken by jumping, but by a combination of a spring and a sprint; it

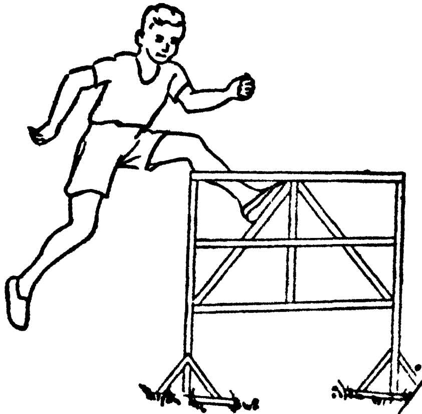


Fig. 6

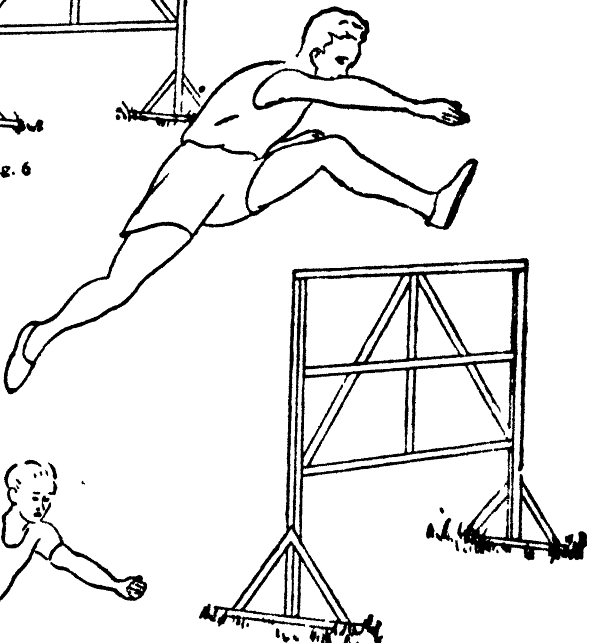


Fig. 7

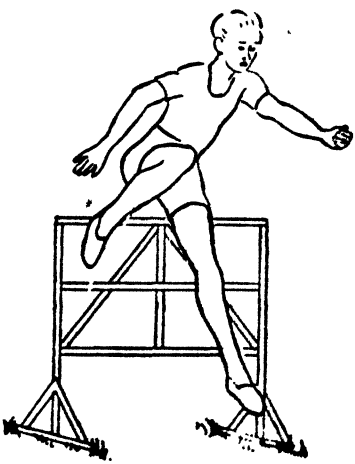


Fig. 8

is speed and spring which will take you over (coupled with the technique outlined below), and if you find difficulty in getting confidence at first, practise over low hurdles of 2 ft. 6 in. height.

The runner starts exactly as in an ordinary sprint. It is essential that he should always take off with the same foot and get the same leg first over the hurdles; therefore, he must learn the peculiarities of his stride and exactly how many strides are needed. To begin with, place a single hurdle on the track at the proper distance from the starting line, and carefully note the number of your strides, where you come down, and particularly where the last stride before the take-off brings you. In the future practices these distances should be maintained as closely as possible. When within about five feet of the hurdle you take off, clearing the hurdle in the manner noted below. After acquiring confidence, place three more hurdles in position, nine yards apart, which should suffice for any further practice. The number of strides from where you touch down after clearing the first hurdle must also be counted, and the spot noted at which you arrive naturally before taking off for the second, and so on. If you can cover these distances regularly within an inch or two, you will acquire that self-confidence which is so important to hurdlers. The run-up to the first hurdle must of course be made as fast as possible (as if the obstacle were not there), for it is *momentum* plus spring which carries one over; on the other hand, try to correct any lack of balance or swerving, and also overstriding, all of which may be fatal. As one takes the last stride before taking off, the leading leg, slightly bent, is thrown up and out across the hurdle, and straightened; the heel should just clear the bar (fig. 6). The shoes, by the way, should have extra heel spikes, as well as a pad to reduce the jar on coming down again. This forward motion of the leading leg must be straight out, the limb must not be swung sideways. The opposite arm comes forward in sympathy, and the runner's body should bend well forward, so as to get the main weight across the bar as quickly as possible. These actions bring up the rear leg, which straightens out, thrusting upwards and forwards from the toe. As the front leg is about to fall, one is literally doing the splits across the hurdle (fig. 7). The rear leg, well bent at the knee, and brought up till it is almost horizontal, is thrown across the bar, at the same time as the body and leading leg are falling on the far side; keep the arm which is beside the leading leg well in to the body. As the leading leg comes down it should be dropped to the ground smartly (fig. 8), for

from that leg you take off on your next stride, and should therefore get on your toes as fast as possible, the rear leg meanwhile still swinging forward, then down, aided by a strong thrust forward from the opposite arm. You then take four (or possibly five) strides to the next hurdle, and repeat the performance. The more automatic these actions become, the prettier the hurdling, and the faster you will surmount the obstacles. Should you have the misfortune to bring down a hurdle while in full flight, the best thing to do is to try to fall clear, throwing out the hands so that they take the first shock of the tumble. After such a misfortune, as soon as you have recovered, tackle the same hurdle again; this helps one speedily to regain confidence.

Hurdlers must be lissom, and their training therefore calls for plenty of free exercises. Haunt the gym. Practise at the horizontal bars, throwing first one leg over, then the other, then both. (Some good exercises are given in this book, page 467.) Skipping is a great loosener-up, besides strengthening the muscles of the ankles. And, of course, do not neglect pure sprinting. It is a common fault for the tired runner, after he has surmounted all his hurdles, to pause a moment before the final run-in, or even to stumble; this should be watched for and persistently corrected, for it is in the final run, as a rule, that the race is won.

JUMPING

The Long Jump

The long jump, much less specialized than the high jump (which is pure art), is really a combination of a sprint and a leap; and the more speed you can get up (provided of course that you jump in proper style) the better you are likely to shine.

The distance jumped is measured from the edge of the take-off board nearest to the pit to the nearest point touched by the jumper's body when he falls; if therefore you should fall backward you will knock several feet off the distance jumped.

There are two distinct styles employed by good long jumpers. One is a straightforward spring, with the body bunched up, knees tucked under the chin, and hands and head well forward (fig. 9). The other differs in that the jumper " bicycles " with his feet while in the air, in the effort to gain more inches. Both methods have their advantages, but the former is far more generally employed.

Just as in a sprint or a hurdle race, it is desirable to be able almost automatically to take off from the same spot, to take a run up of the same distance, and to use the same leg for taking off. These things, which are only to be acquired by practice, not only give a man confidence in himself, but they actually strengthen the limb employed. Above all things, the distance jumper must be well balanced and he must jump straight. The distance of the run-up depends upon how soon you can get into your maximum stride—thirty yards or so, as a rule; for once off the ground, only your momentum keeps you going forward. Therefore, it is also important to jump high, at the same time as you jump forward. Get someone to hold a thread across the pit at rather more than half the distance you can jump, and at least three feet above the ground; and in your practice aim at clearing this invariably. Of course you will need someone to mark carefully where your feet come down; but don't leave the marker *in* the pit, or you may be sorry if you fall on it! As the long jumper feels himself attaining his maximum momentum, he must have the assurance that his jumping-off foot will land fairly on the board, and preferably near to its front edge. From this foot he hurls himself up and forward, thrusting with all his force from the ball of the foot and the toes. As he rises, he should draw in his legs and keep his arms pointing straight forward —in plain words, he should be bunched up as much as possible; head and neck also leaning far forward, and eyes directed on the spot where he intends to land (fig. 9). As he comes down, he must throw his feet out, but not so far as to imperil his balance, or he will tumble backwards, with the result already noted. One final word: do not jump too often in any practice, because the muscles tire very quickly; and on the day of competition, do not jump at all until you have to.



Fig. 9.—The long jump

Jumpers should have a couple of extra spikes in their heels. They

should also wear a pad inside the heel of the shoe, to take up the jar, especially if they are heavy men.

The best training for a long jumper is to have sharp bursts of sprinting, up to fifty yards, timed against a watch. Ankle and bending exercises also help, of course, but it is the speed of the run-up which counts most.

High Jump

There is one feature about both high and long jumps which sometimes bothers the young athlete, but which should really help him in his task. He is not competing against anyone else, but only against himself. He knows what distance or height he has achieved before, and his aim therefore is solely to better that. What the other competitors do cannot matter very much, for even the spur of competition cannot take one very far beyond one's previous best, especially after a long series of preliminary jumps. In high jumping personal style, therefore, and the mechanical repetition of the same actions, count for everything.

To begin with, it is essential to jump under proper conditions. The uprights must be 12 feet apart, and the bar should rest firmly but lightly on the *far* side, so that the merest flick will knock it off. (Never overlook to jump from the correct side, or you may foul the bar and bring about a nasty accident.)

Except by watching it done, one can rarely grasp the best high-jumping technique. Two main styles are involved. In the first, the jumper makes a short run-up directly towards the bar, throws himself into the air, and while crossing the bar turns so that he comes down on the far side still facing the bar. In the second style, he approaches the bar diagonally, tackles it with the nearer leg first, and almost literally rolls over it.

The spot for the take-off is the most important, and once fixed to suit your style and leg, it should not be varied. Obviously, if you take-off too near to the bar you will hit it during the ascent, and if you take-off too far away you will probably hit it when coming down. Assuming that you spring off the left leg, stand facing the bar, at such a distance that when the free (right) leg is swung up in a high kick it will just miss touching the bar. Mark this place well, and in your run-up so arrange the strides that the left foot comes down upon it; after a time you will be able to judge this distance automatically.

When approaching for the jump, do not run too fast or be hurried in any way. Take a few springy strides, and at the critical moment thrust down the left leg hard, from heel to toe, so as to urge yourself upwards with all your force. Approach the bar directly and try to refrain from drawing back in the fear that you will run into it; the worst that can happen at this stage is that you will knock it over! As you rise, and the rising leg goes over, fling up your arms so as to get the right arm forward and across the bar (fig. 10). This induces a turning movement while above the bar. The rear leg is now coming up. Snap it up, flexed, until it is almost parallel with the bar and just above it. The forward twist of the leading leg and arm will compel

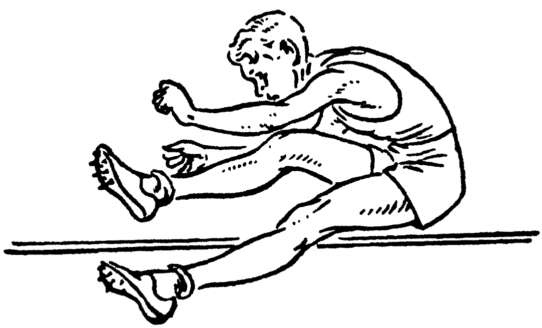


Fig. 10.—The high jump

you to bring your hips up, especially if you lean the body back. The leading leg should be flung straight out, and the arms, neck and head as nearly as possible in line with it. Thus, as you cross the bar your take-off leg will be undermost, and it is upon that foot that you should drop.

The rolling jump is more difficult to acquire. It is an American style, which has produced some remarkable figures. The jumper approaches the bar sideways, and when within distance swings up the *nearer* leg to and just over the bar, at the same time as he jumps upwards, throwing his full force upon the opposite heel and ball of the foot. The forward arm is thrown over the bar and the body straightened out. As the rear limb comes up, he literally rolls over the bar (so as to get those awkward projections, his hips, across), with body extended and leading leg sharply flexed at the knee. He is now facing the ground and is compelled to come down on hands and feet.

In the jumps, as in hurdling, free gymnastic exercises are excellent practice; but of course the true jumper must in addition have a natural spring, which he should do everything possible to strengthen. This does not mean jumping too much or too often; and it is well to remember during a competition that your muscles soon tire, so do not over-exert yourself at the lower heights. It is important to have a sweater by you, and trousers; and put them on till it is your turn to jump again, for nothing ruins a jumper more rapidly than cold. Practise high skipping, an excellent strengthener for the ankle muscles. To acquire a good style, jump repeatedly over low bars, trying to remember to do the same thing exactly each time; you can gain height later, but you can never get over a bad style. Best of all, jump with experts whenever you get the chance, but do not slavishly copy them unless it suits your own style.

CROSS-COUNTRY RUNNING. PAPER CHASE

We cannot conclude these brief notes without reference to what, for most young runners, is the best fun of the winter season, a run across country. This sport particularly develops the team spirit, and there are few athletic exercises more delightful than to hunt the hares on a bright winter afternoon, nosing out the real trail from the false, making the dead twigs in the bare woods crack as one passes, and then, after a fleeting glimpse of the distant quarry, losing them again behind the next hedge. Such social runs are conducted by wise club secretaries with due regard to the powers of everybody present; the last thing desired is to run a fellow off his feet, yet the event provides valuable stamina-building for the serious competitions of the spring. As to the championships, the keen runner will find no lack of opportunities—there are almost too many in fact; and one thing that he must guard against at all times is to do too much running early in the season, especially at the longer distances.

When racing in a team, remember that although the individual winner may be much faster than yourself, you may still be a valuable member of your team. The rule is still true (and still broken) that club spirit during a race is best promoted by everyone in the team wearing the club's costume, and not any old outfit to which

he has taken a fancy. A wise team will have practised its tactics beforehand, and will if possible have gone over the course at least once; individually they may not be very fast, but if they pack together well they may be a quite formidable team nevertheless, especially if the first six men home score.

Cross-country running is a game for stout-hearted " he-men " only. One must take the rough with the smooth, and as a rule there is very little smooth to be found. You will therefore need stamina first, persistence second, patience third, and speed last. I do not think that boys should run more than 3 to 5 miles, but if you must go in for a 7-mile run you will need some hardening first. Practise repeatedly the breathing exercises mentioned at the beginning of this article. Take good sharp walks, as fast as you can get along, on the road for preference; you will find this requires a lot of effort, so concentrate on making it effortless, for an effortless style means that one is saving energy for a critical spell. Such sharp walking also teaches one balance, a matter most essential to the distance runner. When running on the road you can take good strides, but keep the feet well down—Arthur Newton, one of the greatest distance runners ever known, barely took his feet off the ground. On grass or ploughed fields a short stride is imperative, and you may save yourself many a sharp jolt if you look where you are running. Shoes should be stronger than track shoes, with a little more room to spare, but they must be pliant and firmly on at the same time. When you come to a brook, drop in without hesitation and wade across; to jump it is tempting, but you must slow down while considering just where to take off, and you will certainly stop for a moment on the far side; besides, the act of jumping brings other muscles into play and may (temporarily, of course) cripple you completely for further running. Similarly with gates; they should be clambered over in preference to being jumped. Don't mind the mud on the far side; if at the end of your run the runners can be distinguished from the mire, it must be a very unusual cross-country course. Lastly, never despair, no matter how far behind you may be; and if things go wrong, as they certainly will do now and again, just keep slogging on. At such times, one must remember that the fellow in front may be just as badly off, although he is not showing it.

RACE WALKING

Most good athletic meetings include a 1-mile or 2-mile walk, the start of which invariably inspires the spectators to ribald mirth. The reason for this is twofold: race walkers have some extraordinary styles (or lack thereof) in their efforts to get along, and moreover, to walk fairly at high speeds—a mile in anything under eight minutes, for instance—is exceedingly difficult. Race walking over greater distances tends to be more natural as the miles increase, but the action of the limbs is always difficult to master for anything up to 10 miles; in longer races it becomes automatic.

The essence of fair walking is that one foot must always be upon the ground. "Fair heel and toe" means that in striding, when the leading heel comes down, the rear toe has not left the cinders; but it is the walker's natural aim to reduce the time-gap to a minimum. Springing or over-striding is fatal, because sooner or later one must pull the rear leg up before the front foot is down, and disqualification follows.

To ensure fair walking, qualified judges watch the competitors all the way round the track. This is somewhat disconcerting to novices, but without strict judging race walking would become a farce. The principal points to remember, then, are to stand well up—almost upright (quite contrary to a runner's stance); avoid springing forward; and avoid the equally bad fault of shuffling the feet along so that neither is on the ground at any given moment. If you stand well up and keep the arms well in by the side, you are not likely to run.

Speed is worked up slowly. At first you will find it hard to cover one lap in 2½ minutes, but with practice any sturdy youth can be made into a walker, especially if he is on the light side. A champion will cover a mile in 7 to 7½ minutes by fair walking, but even he cannot keep it up, and 7 miles in an hour is very good walking for the rank and file; in two hours it becomes 13½ miles, in three hours 19 miles, and so on. These long distances, however, involve a quite different style and need not be considered here at all, because I do not recommend any boy, in any branch of athletics, to over-exhaust himself. Let us therefore confine our remarks to the 1-mile or 2-mile track walk.

Everybody has a natural stride, which he cannot exceed without becoming unbalanced. This does not favour the long-legged men, because those who take very long strides cannot get their feet off the ground so quickly as the shorter athlete. Having found your natural stride, try a lap or two round the track, bringing down the front heel hard a fraction of a second before you lift the rear toe; as you stride, lock the knee at every step. Swing the arms well, keeping them crooked, but well into the side; swing right across the body towards the opposite ear, as if you were going to hit it. To do this, and at the same time to keep your balance and walk fairly, requires a good deal of attention; but it is the only way. Practise breathing exercises, also free-arm exercises to strengthen the muscles of the shoulders and those over the ribs. Get an experienced walker to take you in hand—they are always only too glad to do so, being ever on the look-out for new talent; and you will soon learn to appreciate " the joys of walking ".

Walkers of course do not wear spiked shoes. Special soft-leather walking shoes are best, but any flexible shoes will do, provided that they have low heels. In longer walks, it is desirable to have shoes (or even boots) half a size too large; and to stop grit getting in from the track or the road, the sock should be turned down well over the shoe top and held in place by a band.

At the start of a race, simply stand naturally facing forward, with the leading toe on the starting line. To get into your full speed as soon as possible requires much practice. One sound way is to take short, quick steps for a few yards and then lengthen the stride; the quicker these steps the better. If you spring forward at the start you may be disqualified on the spot; and many sprint walkers deserve that fate, but the judges usually temper justice with mercy. If you should be disqualified, leave the track at once; you may feel very much annoyed or ashamed at the time, but do not argue with the judge. After the race go to him and ask him to tell you what was wrong, and I am sure that he will be only too ready to do so. I know of a case where a world's champion walker once disqualified the entire entry in a village walking race, one after another; so they turned the event into a 2-mile run and thoroughly enjoyed themselves!

Road walking is both easier and harder than walking on the track. It is easier because after a lap or two a track gets cut up; moreover, if there is any crown on the track the athlete feels himself

soon to be walking on one leg, whereas on our magnificent tarmac roads one feels that one has perfect balance and no fear of small stones. On the other hand, road walking involves going up and down hills. Never take a hill at full speed, unless you know exactly how long it is and where the gradient begins to decrease, or you will soon walk yourself to a standstill. When ascending hills, lean forward slightly and shorten the stride; and endeavour to compensate for such lost inches by taking quicker strides. When descending hills, lean back until you are quite sure that you are walking fairly; and do not take too long strides downhill either, for that is most jarring on a long descent. Keep the attention on the road twenty or thirty yards ahead of you, and keep your head still; avoid jerkiness if you can; and, above all, persevere, even though far in the rear. After all, there is always some chance for you in the handicap!

BIRD-WATCHING AND BIRD-NESTING

Birds are perhaps the most beautiful living creatures. The study of birds is a joy not only to the young, but to the middle-aged and the old. It is a study which never becomes monotonous or dull. One of the most distinguished admirals of the day wrote to me recently: "I envy the people with knowledge of birds; they need never have a dull moment."

I think most boys have a natural interest in birds. It is important therefore that this instinct should be encouraged and developed.

Britain is fortunate in that it has a large and varied bird population. The people of Britain are more bird-minded than the people of certain continental nations, such as France and Italy, where song birds are shot and netted for food. In Britain, even in towns and great cities, the naturalist can study birds. In London, for example, the parks are full of birds. I do not refer to the sparrow, which is found everywhere, even in the most slum-infested areas, but to real countryside birds, such as blackbird and thrush, starling, wood-pigeon, kestrel, black-headed and common gulls, and many species of duck. Those confiding duck of St. James's Park may be visitors from distant lands. A ring on its leg identified a tufted duck which wintered on the water of St. James's Park. It had been hatched and reared in Novaya Zemlya, two thousand miles to the north-east, in the Arctic.

Each one of us unaided can watch and study birds, but a pair of good binoculars are a help, and good bird books are of course necessary. The approach to bird study can be made through the eye and the ear: the one is the complement of the other.

The song of birds is heard mainly in the spring and early summer of the year, yet there is not a month in the twelve when bird song may not be heard, and it ceases altogether only in days of snow and hard frost, when each bird is striving wholeheartedly to find food sufficient to keep itself alive, and has neither time nor inclination to sing.

Let us start at the New Year. We will suppose that the weather

is open, or moderately so, the snowdrops showing white flowers, low on the ground and still unopened, a faint feeling of approaching spring in the air. If we go out into the garden or into the woods we may expect to hear the robin's song in early January. Both robins—cock and hen—sing, but the song of the hen robin is more seldom heard. The robin's song is poured out in a wave—a rush and tumult of liquid notes with a quality of sadness running through them. The wren also sings in January. For so tiny a



For watching distant birds a good field-glass or a good telescope is necessary

bird the wren's song has been described as "shattering". Watch a wren sing. The singer shakes and quivers, as though scarcely able to bear the torrent of song which it has evoked. Although a winter singer the wren is not really a hardy bird. A friend of mine, who lives in the Perthshire highlands, each spring destroys the old house martins' nests on his house, in order that the sparrows may not commandeer them and nest in them. The winter of 1944–45 was a severe one, with prolonged frost and snow from the New Year until well into February. My friend and his wife feed the birds several times each day at a bird table, but the wren does not

usually appear at bird tables, for it is particular in its food. As week after week of frost and snow succeeded one another, it was noticed that the wren population were disappearing. The matter was later forgotten, but when the old martins' nests came to be taken down no fewer than five wrens were found dead in one of them. The wee birds, cold and starving, had huddled together for warmth in the cosy nest, and the intense frost had perhaps numbed them there, and the sleep of death had succeeded to the sleep of weariness.

A bird which may be expected to be heard in song before January is over is the missel thrush, sometimes called the storm cock. As its name implies, the storm cock is happy in wild weather. His song is heard when a gale of westerly wind shakes the leafless branches and moans through the canopy of the forest. The missel thrush chooses usually for a singing post the topmost branches of a high tree, from which he flings his song in the teeth of the storm. The song thrush sings steadily and evenly; the missel thrush sings in bursts of song, each burst, consisting of a dozen notes or less, poured out with passionate strength; a brief pause, and the song is repeated in an almost similar form. The missel thrush is the largest British song bird.

In places the song thrush sings throughout the winter, but the winter song is usually that of young birds, tuning themselves in. It is late in January before the song thrush sings his full sweet song. The song thrush's notes are usually calm and serene. You will recall the immortal lines of Robert Browning:

> That's the wise thrush; he sings each song twice over
> Lest you should think he never could recapture
> The first fine careless rapture!

Of the Hebridean song thrush, which sings in the treeless Western Isles, a friend of mine, a bird-lover, wrote the following notes on hearing for the first time, on the north-west wing of the Isle of Skye, the song of a Hebridean thrush:

" A Hebridean song thrush sang every evening on the chimney stack above my room. One glorious evening at midsummer he sang (by Single Summer Time) until almost midnight, gazing (so it seemed) over the sea on to the long line of the Outer Hebrides, and on the gorgeous colouring of the sky after a sunset which, without darkness, would soon change to sunrise. Sometimes he would cease

his song, and remain for a time quite still, then again lift his voice in adoration."

The thrush is a mimic, although not so finished a mimic as the starling, which sings under favourable conditions throughout January. The starling is not a great singer, yet he is a great and unrivalled mimic. There was some space of late devoted in the press to a tame starling in the Thames valley, which was able to talk. That is not surprising, and I should say that a tame starling could be taught to speak in human language more easily than a parrot. The beautiful song of the curlew is often imitated with much skill by the starling, and in the Outer Hebrides I have heard a starling give a perfect imitation of the call of a whimbrel, in early May, when these birds were migrating northward over the Hebrides.

In January, sometimes even before it, the song of the dipper or water ousel may be heard. The dipper haunts the clear, fast-flowing burns and rivers of Wales, the north of England and Scotland. The dipper's song is subdued, musical and long-sustained; it might almost be likened to the song of the stream itself.

In February the chaffinch breaks his silence. His cheery song has been likened by a friend of mine to the words: "You-silly-little-bird I'm-going-to-BEAT you!" The chaffinches in each district in Britain vary slightly, but unmistakably in their song. When a boy, I used to note the differences in their song along the valley of the Aberdeenshire Dee. The chaffinches of Banchory had a different pattern of song from the chaffinches of Aboyne; those of Aboyne were unmistakable from those at Ballater, and at Braemar, near the head of the valley, one heard yet another pattern of chaffinch song. In February, when the chaffinch begins to sing, his song is imperfect, and ends when only three-quarters complete. Warde Fowler, in one of his books, compares the song of the chaffinch to a bowler running with fast steps up to the wicket, and with an overhand turn of the arm delivering the ball; he remarks that when the chaffinch begins to sing he reaches the wicket, but is unable to "deliver the ball".

In February, usually near the end of the month, the blackbird sings. The song of the blackbird, which is said to be the most numerous bird in Britain, exceeding even the house sparrow in numbers, is one of the most beautiful bird songs. It is a liquid, flute-like song, and a phrase which the bird fancies may be repeated time after time. The song is not measured and steadily delivered

like the thrush's song. A few liquid notes are sung, there is a pause, and the notes, or perhaps different phrases, follow. The blackbird's song is nearer in construction to the song of the missel thrush than to the song thrush. The blackbird begins to sing comparatively late in the season of bird song and ends early. It is rare to hear a blackbird sing in the country in July. In a town, for some reason, the song continues later, and is heard habitually to the middle, and sometimes to the end, of July.

Another February singer is the skylark. This is a unique singer among birds. The songster mounts on rapidly driven wings against the breeze, higher and higher, becoming smaller and smaller, until at last he is lost to sight in the deep blue heights of the sky. Unseen the singer pours earthward his flood of music; the notes fall in a torrent of rapture, then, after a time, the singer himself is seen, in full song, slowly descending. The last few yards of the descent are made more quickly; the flight is altered so that the bird may see that no enemies are near. In the Western Isles the skylark arrives in February, replacing those of his race which have wintered here, and which now return toward the north-east, some as far as Siberia. In the Western Isles, or Hebrides, the skylark is named the Virgin Mary's Linnet.

The great poets have written of the skylark's song:

> Higher and higher from the cloud thou springest,
> Like a cloud of fire;
> The blue deep thou wingest,
> And singing still dost soar, and soaring
> Ever singest.

Wordsworth wrote of the skylark's song the immortal line

> A privacy of glorious light is thine.

A more humble song is the yellow hammer's, also heard in February. It has been likened to the words, " Little-bit-of-bread-and-no-cheese ", the singer dwelling lovingly on the word " cheese ". Like the chaffinch the yellow hammer has difficulty in finishing his song in the early part of the singing season, before he has, so to speak, thoroughly " tuned up ".

To my mind the curlew, who begins his song in March, has a charm of singing all his own. I should not perhaps refer to the singer as " he ", for both male and female birds sing. The trilling whistle, uttered faster and faster as the singer soars on tremulous

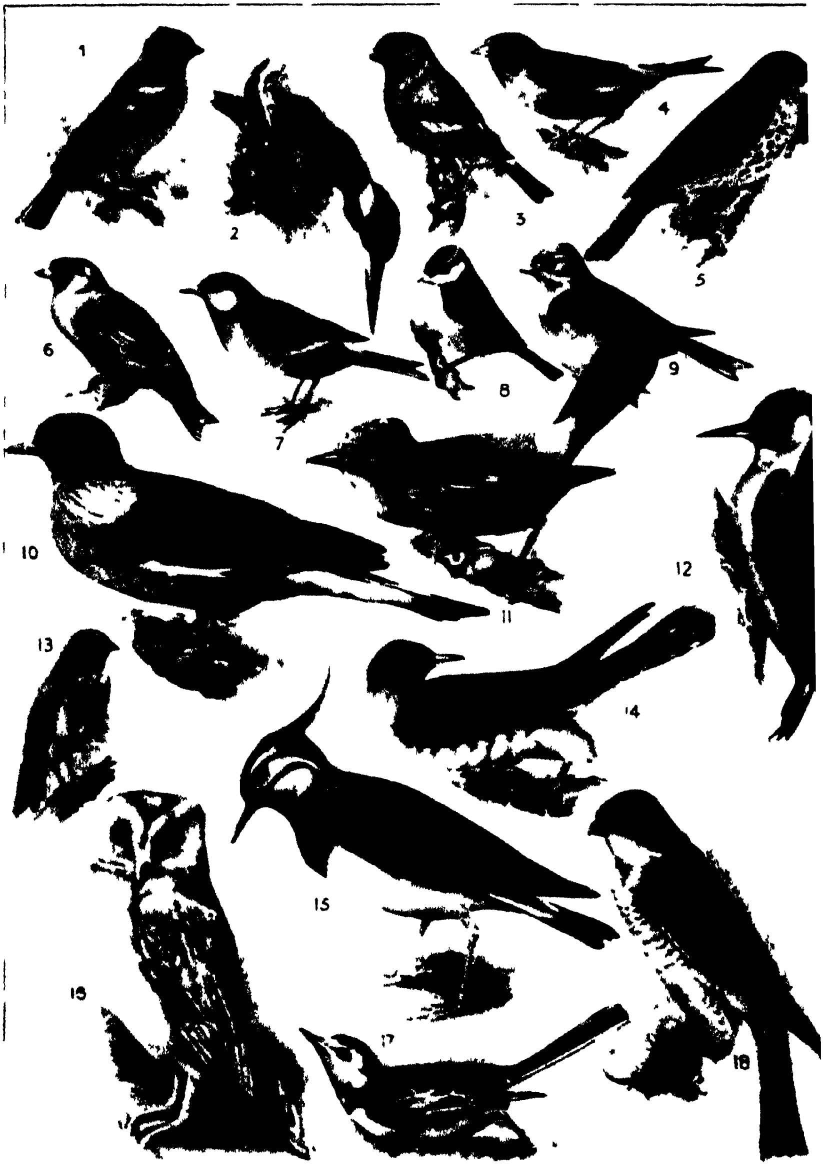
wings or glides aerily to earth, has in it a quality of beauty and sadness found in the song of no other bird. My wife and I have lived for most of our lives in curlew-haunted country, and I recall, during the First World War, when I was stationed far from the singing haunts of curlews, we used to go by train and then on push bicycles to a high-lying moor in March and April, where we could be sure of hearing the curlew's song, and in hearing it recapture some of the beauty of earlier days.



By sitting quite still and silent it is often possible to watch birds at close quarters. Movement and sound betrays the watcher and scares the birds.

Another moorland bird, the small and inconspicuously plumaged meadow pipit—called in Scotland the heather lintie—sings in March. Like the skylark, he climbs into the air, but only a little way, and then, still singing, descends to earth like a tiny parachute.

April sees the return of the warblers—small and delicate birds which have wintered far south of Britain. The chiff-chaff indeed is often with us before the end of March, but it is April before the willow warbler arrives. It is a red-letter day in the life of the bird-lover when he or she hears the first willow warbler in song. A small and delicate song it is, and running through it is a quality of sad-



SOME BRITISH BIRDS

1 Chaffinch 2 Kingfisher 3 Bullfinch 4 Greenfinch 5 Song Thrush 6 Goldfinch. 7 Great Tit 8 Blue Tit 9 Yellow Hammer 10 Ring Dove 11 Jay 12 Green Woodpecker 13 Linnet 14 Cuckoo 15 Green Plover 16 Barn Owl 17 Pied Wagtail 18 Sparrow Hawk

ness and humility. I have listened to it after an early May snowstorm—no uncommon thing in the Highlands—and have heard these mournful, tuneful cadences of song proceeding from birch trees, snow laden and pendulous with that white, delicate covering. A sturdy blackbird, as he alighted to sing, shook the snow from the trees, yet the willow warblers were so delicate that they scarcely disturbed it. Lord Grey of Fallodon, in his book, *The Charm of Birds*, describes the willow warbler's song as a "succession of slender and delicate notes, forming a completed sentence, which is repeated again and again at short intervals". He says, truly, that the song is entirely without any note of bravado, exultation, or challenge, such as is suggested by many other songs.

The wood warbler is less common than the willow warbler. The song has an elfin quality; it consists of a shivering and quivering succession of notes that are almost an ecstasy. This is usually preceded by a clear, gentle whistle, oft-repeated.

Blackbird and garden warbler, sedge warbler, reed warbler and others, arrive and sing in April, and the common and lesser whitethroat are also heard during this month; the excited, scolding song of the common whitethroat is often heard from roadside hedges.

It is late in April when the king of British songsters tunes and sings—the nightingale. This is usually a secretive bird, but a friend wrote to me to say that a pair of nightingales often fed on his lawn, and when their family were grown they accompanied them, looking like very large robins. The nightingale, like the robin, sees well in twilight, and its song may be heard throughout the night. The song of the nightingale is a repetition of one set of notes, followed by a pause, and then by a succession of other notes, which may resemble the earlier ones or be entirely different. It is sung by moonlight, above a fragrant carpet of wild hyacinths and among the young bursting leaves. You will remember Keats' "Ode to the Nightingale", and how in immortal words he wrote that the nightingale's song was the same which

Oft-times hath
Charm'd magic casements, opening on the foam,
Of perilous seas in faery lands forlorn.

(In his original MS. Keats wrote "keelless seas"; he later deleted "keelless", and in its place wrote "perilous".)

The cuckoo, too, arrives in April. Its song is simple, yet it adds a great charm to the countryside; the soft, double note, tire-

lessly repeated, seems like the voice of the spirit of spring as she moves northward and awakens the sleeping earth to energy.

I have touched lightly on bird song. I might write more—of the song of the oyster-catcher beside some Highland river at midnight; of the wonderful song, rarely heard, of the elusive greenshank, when the singer pours out a succession of flute-like calls when flying high backwards and forwards overhead. There are few birds which have no song, and it is a delight to him or her, who loves nature and is eager to know these songs, to search out the singers in wood and field, moor and mountain. Lord Grey of Fallodon once told me that he had wished especially to hear the song of the greenshank, but had never heard it. I think, so seldom does the greenshank sing, one must live near greenshank country in order to hear that song.

The best way to learn the ways of the birds that are with us in spring is by listening to their song. But there are birds— for instance, the swallow tribe—which can be identified and recognized by their flight rather than by their song, although our barn-swallow has a charming, warbling song.

There are four swallow-like birds in this country, and it is surprising how few people know one species from another. Let us begin with the largest of them, the swift. It is true that the swift does not really belong to the swallow family, but is nearer to the nightjar, yet its associations are rather with the swallows.

The swift is a dark, sickle-winged bird, tireless in the air. Town dwellers, as well as those who live in villages and in the country, know the swift. I have seen many swifts flying above the streets and houses of Edinburgh and Glasgow, and it is common on the outskirts of London, though not above the city itself. The swift is exceptional, if not unique, among birds in that it drives its wings alternately. This is so remarkable a fact that it has been doubted by some observers, but I believe is well authenticated. In summer warmth, swifts from the low ground fly up to hawk insects above the highest Scottish hills. In June, 1945, when on Ben Wyvis at a height of more than 3000 feet above the sea, I saw a gathering of swifts fly backward and forward above the sun-heated slopes, fly-catching. About the same time, a correspondent told me that he had been watching swifts above the summit of Cairngorm, 4084 feet above the distant sea. Swifts nest in old steeples, in crannies beneath the eaves (always out of sight), in houses. On

a fine summer evening a company of swifts may fly backwards and forwards past their nesting sites, at tremendous speed, screaming in wild abandon as they fly through the dusk. A swift never deliberately alights on the ground; if it should strike wire netting and fall to earth its legs are so short that it may find it impossible to rise, and I have found one in this plight in the grass. There it crouched, cold and miserable, and undoubtedly would have died had I not taken it into the kitchen, where it recovered in the warmth. I then carried it outside, and threw it into the air, when it flew happily away. The swift drinks, gathers nesting materials, even mates, in the air.

Swallow, house martin, and sand martin—all are smaller than the swift. The sand martin is the least of the three, and is brown on the back. It nests in holes which it digs in gravel banks. The swallow and the house martin nest in, or on, human habitations. The swallow may be known by its long, deeply forked tail, and its red chin and throat. The house martin is a dark-blue bird, with white at the tail base. People often speak about swallows nesting beneath the eaves of a house. They confuse the house martin with the swallow; the swallow nests *inside* outbuildings such as cart sheds, cow byres, and the like. Its nest is small: it is made of mud but is *open at the top*. The house martin builds a much larger nest of mud, beneath the eaves of a house; the narrow entrance is near the top, but permits only just sufficient room for the bird to fly in and out. The enemy of the house martin is the house sparrow, which often takes possession of the house martin's nest when it is finished. It has been said that on occasion the house martin will wall in the opening after the hen sparrow has begun to sit, thus imprisoning her so that she dies of starvation.

My space is nearly filled, and I have written nothing of the birds of prey—the lordly golden eagle, grandest of British birds, the fierce peregrine, the mouse-eating kestrel, the ruthless sparrow hawk and merlin, the hobby, so fast that he is able to catch swifts on the wing. Nor have I mentioned the great army of birds which arrive in Britain at the onset of autumn—the tribe of the whooper and Bewick's swans, the barnacle geese from Greenland and Spitsbergen, the white-fronted geese from Iceland, and smaller brent geese from Novaya Zemlya. Nor have I described the waders from the far north—the knot which circle above an estuary with great wariness, flying, turning and diving through the air as one bird,

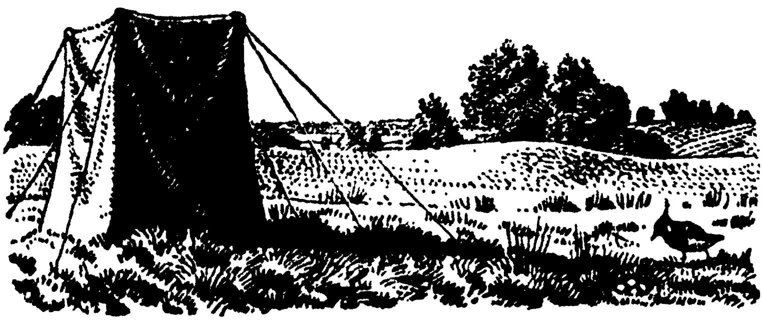
the gnomish dunlin, the white-breasted sanderling, the godwits and grey plover, the great white glaucous gull from the Arctic, the merciless greater black back, the sharp-winged black-headed gull. Of the duck, too, I have said nothing—the widgeon which fly whistling through the dusk, the golden-eyed and tufted ducks, expert divers both of them, the small and jaunty long-tailed ducks, scoters, smews and goosanders, pochards, pintails, and many others.

Coward's books on birds and the *Practical Handbook of British Birds* will fully describe anything I have omitted.

My last few remarks must be on bird-nesting. Most boys go through a phase of desiring to collect the eggs of as many species of birds as possible. Egg collecting in moderation does no harm; what is harmful is the desire to acquire the eggs of rare birds, and to possess oneself of as many clutches of eggs of the same species as is possible. The desire to collect birds' eggs should be changed as quickly as possible into the desire to study birds at the nest; to photograph them at home. This will give more lasting happiness and profit than the finest collection of eggs. When the nest is found and the eggs are taken the chapter of knowledge is ended; when the nest is found and the hatching and youthful days of the young birds are studied, and the ways of their parents, knowledge is increased without doing harm to the birds. Especially remember rare birds. We have as a nation certain rare and beautiful birds. Through shooting and egg collecting we have lost the osprey and the sea eagle; let us see to it that we have not the shame of exterminating other rare birds which still live in these islands. Some of these rare birds are the golden eagle, the hobby, the dotterel, and, farther to the south-east, the Dartford warbler.

Many birds make nests of great beauty. The nest of the long-tailed tit is a work of art, and may take many weeks to complete. In one nest of a pair of long-tailed tits 1776 feathers were counted. Think of that; the birds—for I think it has been proved that both cock and hen help at the building of the domed nest—must have made 1776 visits with feathers alone. They must have flown several hundred miles. No wonder that the long-tailed tit's nest takes weeks, sometimes months, to complete. What a contrast to the nest-making of the guillemot, or the fulmar! The guillemot lays her large pear-shaped egg on the bare rock; the fulmar scrapes out a shallow depression on a ledge of the cliff. Yet all ocean birds are not so casual. The gannet, for example, makes a nest of considerable size,

and brings to it strange articles. The gannets of the Bass Rock, nesting near the classic golf links of North Berwick, sometimes take golf balls to their nests. But it is in land birds, and chiefly in the smaller land birds, that the true art of nest-building is found. The chaffinch's nest is a model of neatness. It is built in a tree or bush, and so well does it harmonize with its surroundings that it is hard to see; each small piece of lichen and bark is placed delicately yet firmly in position. The willow warbler, chiff-chaff, and wood warbler make domed nests. The willow warbler and the chiff-chaff both line their nests deeply with feathers, but the wood warbler



For watching nesting birds a hide made of sacking and poles is useful and often necessary. The hide should be placed at a distance from the nest in the beginning, then, day by day, brought gradually nearer the nest.

carries no feathers in the nest. This is perhaps strange, yet not more strange than the difference in the nests of song thrush and blackbird. The blackbird is content with a grass-lined nest; the song thrush, after reaching this stage of completion, adds a layer of mud. It might be thought that it would be less comfortable to brood one's eggs on a layer of hard, dried earth than on a bed of soft grasses. Why, then, add the layer of mud? The bird that builds the largest nest is the golden eagle. The eagle's nest is called an eyrie. A pair of eagles may use the same tree, or rock, for many years. I have known one nest for forty years. It is on an old pine tree, and is now a full fifteen feet deep. Think of this: a man six feet high, standing at the base of the nest, would be unable, by nine feet, to look into it.

Some birds nest on the ground with no shelter or protection; the eggs of these birds are usually protectively coloured, so that they

can be seen with difficulty. The oyster-catcher's eggs are like the shingle bed on which they rest; the eggs of the curlew resemble the moorland; the eggs of the terns the sand.

The earliest birds to nest are the crossbill and the heron, which lay in early February. In some districts the raven is as early a nester as the heron; in others he is a few days later. The latest birds to nest are the hobby, the nightjar, and the stormy petrel. The stormy petrel, a bird scarcely larger than a swallow, does not, in the Hebrides, lay her one white glossy egg until July, and I have seen the young still in the nest in November.

The joy of birds, the charm of birds, the beauty of birds; all these things can be seen and felt by the bird-lover, who, wherever he or she may be, is never lonely.

CRICKET

Historical.

The origin of Cricket, most English of games, goes back to remote antiquity. The name probably means "Throwing at a stick", although this is by no means certain; and the practice of trying to knock a stick out of the ground, when it was defended by a second player having another stick, may plausibly be thought of as the earliest form of the game. The word "Cricket" appears in 1508, when "bluff King Hal" had just come to the throne. About the year 1700 cricket was well known and much played in the south-eastern counties. At that date the wicket comprised only two stumps, each being one foot high, but with a wide gap—some accounts say two feet—between them; a third stump or bail lay across the top. To bowl a man out the wicket had to be broken; but to stump him, the stumper was compelled to drop the ball into a hole in the ground, midway between the stumps and directly under the bail. The bat also could be of almost any size or width. For a long time it was curved, hence anything like accurate batting in the modern sense was impossible, especially on the rough wickets of those days.

In the second half of the eighteenth century the game attained great celebrity, being patronized by various noblemen, who got strong teams together and staked large sums, sometimes £500 or even £1000, on the result of a single match; hence one important qualification of a player—almost as essential as his cricketing ability, in fact—was his honesty, the certainty that by half-hearted play he would not sell the match.

About the year 1750 the village of Hambledon, not far from the Portsmouth road, and under the South Downs, became a nursery of great cricketers; and for the next forty years the Hambledon men not only defeated all-England teams on many occasions, but they built up much of the tradition on which modern play depends. Later, Surrey, Kent and Middlesex became centres of the game; Nottingham also had a pretty good team, as did Sheffield. Essex played as a county before 1791. There were formal rules before these days, but they were overhauled by the Marylebone Cricket

Club soon after its formation in 1787, and the M.C.C. has been lawmaker to cricket ever since. The original Marylebone Club played at Lord's, so called because it was owned by Tom Lord, a moderately good bowler. The ground at first was on the site of Dorset Square; but in 1811, when the rent was increased, Lord moved his ground to the North Bank of the Regent's Canal, St. John's Wood, taking his turf with him. Four years afterwards he again moved, to the famous ground which is the Mecca ot cricket lovers all over the world, and again the turf was removed; hence the game has been played continuously on Lord's turf for at least 160 years.

The system of playing for County Championships is quite modern, going back only to 1896, but inter-county competitions are much older. Yorkshire, who have so often been the champions in recent years, was founded as a county club in 1861. Kent, whose standard of amateur play has always been of the highest, and who represent the very spirit of sporting cricket, organized its county club two years earlier; Surrey started in 1845, on the famous Oval ground, which was then used by Surrey's predecessors, the old Montpellier. The first English team to visit Australia did so in 1861, but it was not until 1880 that the first "Test Match" took place. There was a representative game of this kind, however, at Melbourne in 1877, the tourists being beaten by 45 runs. Thanks to their delightful climate, clear air and superlatively good wickets, the Australians have always proved formidable competitors at cricket, and have soundly trounced the representatives of the Old Country on many a field. In 1882, after a highly exciting game at the Oval, when England lost by 7 runs, some anonymous wit composed this memorial:

In affectionate remembrance
of
ENGLISH CRICKET,
which died at the Oval on
29th August, 1882,
Deeply lamented by a large circle of friends and
acquaintances.
R.I.P.

N.B. The body will be cremated and the ashes taken to Australia.

This was the origin of the oft-renewed battles for possession of the mythical Ashes.

South Africa, where play usually takes place on matting wickets, has also produced some great cricketers. Both India and the West Indies have also sent strong teams to this country, the West Indian player Constantine being one of the best all-rounders in the world.

Some of the Laws.

Although every cricketer should familiarize himself with the Laws, we propose to give here only a selection of the most essential ones.

Some of the laws of cricket have a curious history. For instance, in 1775, one bowler during an important match three times sent a ball through the stumps without upsetting the wicket; at that date the wicket comprised two stumps only, 22 in. high and 6 in. apart. The bowler's misfortune led to the redesigning of the wicket, a third stump being added, but the total breadth left at 6 in.; for on the bumpy and uncertain grounds the bowler was incontestably better favoured than the batsman. Again, it once happened that a batsman took his stand armed with a bat so wide that it completely covered the wicket; all that he had to do was to block the ball and avoid knocking up a catch. This absurdity was overcome by making a law that the width of the bat must not exceed 4½ in. In 1817 the wicket was increased to 8 in. by 27 in., the dimensions which it has preserved until the present day.

The old bowlers all bowled underhand; but some of them were exceedingly fast, and could make the ball rise in the most terrifying manner; nevertheless, neither pads nor gloves were worn by batsmen, who in early days played in knee-breeches and silk stockings, and in early-Victorian times in trousers and top hats. At the 1830 revision of the Laws of cricket, one law read: "If any player stop the ball with his hat the ball shall be considered dead and the opposite party shall add 5 runs to their score." This has now become Law 41, which says: "The fieldsman may stop the ball with any part of his *person*, but if he wilfully stop it otherwise the ball shall be dead and 5 runs added to the score."

Round-arm bowling was for long contrary to the laws, being regarded as a throw. It is said to have been introduced by John Willis about 1820, followed by William Clarke, a celebrated bowler, much to the indignation of Old Nyren, doyen of cricket writers, who thought that it must spell the ruin of the game. In the 1835

Laws the M.C.C. permitted the hand to be level with the elbow at the moment of delivery, the arm being horizontal and the back of the hand uppermost. The present style of bowling has been legal since 1862. As regards so-called "Body-line bowling", about which there was such a controversy with the Australians before the war, it is perfectly fair, provided that the bowler bowls at the wicket and not at the batsman; bowling deliberately to hit or hurt the batsman has always been unfair.

By the way, whatever the Laws of cricket, the *spirit* of the game is what matters most; to take an unfair advantage, or what is thought a mean action, is heavily frowned upon, even though legal. For instance, when a bowler has stepped up to the crease and has raised his arm to deliver the ball, if the non-batsman leaves his crease in his eagerness to follow up, before the ball is bowled, the bowler is perfectly entitled to bring his arm round, ball in hand, and knock down the wicket with it; and the batsman will be out. But many players, and some umpires, do not like it.

Here are some of the Laws which every cricketer should know by heart.

The distance between wickets, which must be opposite each other, is 22 yards. Each wicket comprises three stumps, having a total width between 8 in. and 9 in., with two bails on top, each between 4 in. and 4½ in. long, projecting not more than half an inch above the stumps. The stumps must be between 27 in. and 28 in. out of the ground. A wicket may be changed if the ground becomes unfit for play during a match, but only by consent of both sides.

The bowling crease must be marked in line with the stumps, and extending four feet beyond them on either side. At each end a return crease must be marked, at right angles behind the wicket. When delivering the ball, the bowler must have one foot at least on the ground within the return crease and behind the bowling crease; otherwise the Umpire shall call "No ball", which gives one run to the other side.

The ball must be *bowled*; if thrown or jerked, the Umpire shall call "No ball". What constitutes a throw is not easily defined, but we will return to that point later.

We have seen how a bowler may legitimately put out the batsman at his own end; but if he throws the ball at the wicket, misses it, and a run ensues, such run is scored as a "No ball".

The Umpire must declare "No ball" immediately upon de-

livery. This serves to warn the batsman, who may then have a smack at it if he so chooses, although otherwise he might have let it alone; and should he be caught no penalty ensues. If runs ensue they are added to his score, but naturally he may be run out. He can also be out from a No-ball if he obstructs the field or hits the ball twice, just as if it were a fair ball; for these are faults which he should not commit in any circumstances.

If the bowler bowls so high or so wide of the wicket that in the Umpire's opinion the batsman cannot reach it, the Umpire shall call " Wide ", and one run results. Wide balls can be scored from by running between the wickets, the resulting addition to the score being counted as so many wides. The Umpire should not call a Wide until the ball has passed the striker.

If the batsmen score runs from a ball which has not touched the striker's body or bat (other than a Wide or a No-ball), such runs are called " Byes "; but if the ball in passing touches the striker's person, apart from his hand, and runs are obtained, these are " Leg Byes ", even though the ball glanced, for example, off his shoulder.

No Trial Balls are allowed once the Umpire has called " Play " at the commencement of the match and of each innings.

Coming now to the numerous Laws which primarily affect the batsman, the first is the size of his weapon. The bat must not exceed 38 in. in length or be more than 4½ in. wide. (This, of course, hardly applies to boys, who should never play with a man's full-size bat, which requires a man's strength to wield it properly.)

The batsman's ground is within the Popping Crease, a chalk line which must be marked four feet from the wicket, parallel with it, and of unlimited length. He is within his ground if any part of his person, or his bat in hand, touches the ground within the popping crease.

For the wicket to be down, either or both bails must be off; should both bails be off already, the wicket is down when a stump is struck out of the ground. A batsman is not out if the ball merely touches his wicket without disturbing it. Herbert Sutcliffe, the famous Yorkshire and England player, once played-on in a Test Match, but the bails did not fall and he was therefore not out.

A batsman may be caught out, even though the fieldsman hugs the ball to his body. If he be run out, it is not necessary for the wicket-keeper to throw the ball at the wicket; he can put it down while holding the ball in his hand.

The Leg before Wicket Law has a long history. As far back as 1774 a batsman who deliberately stopped the ball from hitting his wicket was out. In 1788 it was ruled that the ball must pitch in a straight line to the wicket, hence a man could not be " Out l.b.w." to a breaking ball. For a century after 1828, he was debarred from stopping a straight ball, which in the Umpire's opinion would otherwise have hit the wicket, with any part of his person. But it was then changed, so that an off-break which, in the Umpire's judgment, would have hit the wicket had not the batsman obstructed it, made the striker " Out l.b.w.". This is the most controversial law in cricket; but if batsmen were more careful to stand properly, and not to defend their wicket so much with their legs, we should hear a great deal less about it, to the benefit of the game.

A batsman is out if he steps back upon his wicket or otherwise knocks it down; but he may hit the ball twice, if necessary, to defend his wicket; or if, after playing it, the ball continues to run on to the wicket, he may stop it with his foot or body (but not his hand), and will be not out.

In junior and club games, one may often see a batsman, after killing the ball close to his crease, " assist " the fielders by knocking or throwing the ball back to the bowler. Strictly, for such an act a batsman should be given out on appeal to the Umpire, unless he has been asked by the other side to touch the ball; because he is not allowed to touch the ball at all, except in defence of his wicket. At the end of an over, however, or after a batsman has been put out and before the next man has come in, this does not apply, since the ball is then " dead "; it is also dead when in the wicket-keeper's or bowler's hand. A ball that lodges in the batsman's clothes is also dead; and it is dead after a fieldsman has called " lost ball ". The addition to the score for a " lost ball " is six, unless a greater number shall have been run, when the actual number of runs made is added. A batsman cannot be run out from a No-ball, should he in striking at it step out of his ground and be stumped. A batsman who gets in the way of the field deliberately—e.g. so as to stop an impending catch—is also out, for obstruction. When a man is run out, if the batsmen have crossed, the one who is out is the one approaching the wicket that is put down; if they have not crossed, the victim is he who left the wicket which is put down. Also, the run which was being attempted does not count. If the strikei be caught, no run is added to the score.

If, in running, the batsman does not get his bat to the ground within the popping crease, the Umpire must call a short run, and the run will not count.

Young players are sometimes uncertain of the position of a substitute. A substitute may field for an injured or sick player, or may run between wickets for him; but such substitute must be acceptable to the opposing side. The batsman is liable for any infringement of the Laws which his substitute may make, and in addition incurs any penalties arising from his own acts.

The follow-on law is quite simple. In a one-day or two-day match the side which is 100 runs or more behind after the first innings may be required to follow on. In a one-day match the captain of the batting side may declare his innings closed at any time.

At present the M.C.C. are again overhauling the Laws of Cricket.

Bowling.

Young cricketers often display much more interest in the endeavour to shine with the bat than in the far more arduous work, with its frequent disappointments, which is the bowler's lot. This is quite a wrong view to take. Almost anybody with reasonably good eyesight and moderate physique can be made into a passable batsman, for a batsman requires only skill; but the bowler must have skill and cunning too. I believe that really first-class bowlers—of whom, by the way, there are not very many, even in first-class cricket—are born, and not made. Nevertheless, by attention to detail, by long practice, and by first-hand watching of experts, one can become a quite formidable bowler in time; and the joy of tricking some cocksure batsman into a simple catch, or of spread-eagling a man's wicket immediately after he has knocked you out of the ground for six, has to be experienced to be believed. The bowler, however, requires above everything else a stock of patience, coupled with as much variety of attack as is within his powers. On a sticky wicket he may tumble out a side almost for nothing—the records show that both Oxford University and the Australians have been dismissed for less than twenty runs; but on a fast, true wicket it is hard work toiling on, hour after hour through the hot summer afternoon, with a captain who has forgotten that he possesses any other bowlers, and a field who drop one's best-intentioned catches; the bowler has to grin all the time.

The first and most obvious rule for the bowler is to play to the batsman, by which I mean that he should study the batsman at all times, whether he himself is bowling or not—his stance, his weaknesses, perhaps a fondness for running out, which may lead to an early dismissal by stumping; perhaps a timorous sort of back play, which may cause him to be driven back on his wicket; and so forth —his best and feeblest strokes; with the aim of exploiting the weaknesses to the uttermost. This is fundamental. It often means that runs will be scored while the bowler is learning how best to continue the attack; but that cannot be helped. No bowler should ever be afraid of being hit.

The second essential of a good bowler is to keep a straight length; on the other hand, this is not everything, for one may play all day at a good "stonewalling" batsman, like R. E. S. Wyatt or those giants of older days, Stonewall Jackson and J. W. H. T. (Johnny Won't Hit To-day) Douglas, without result. But if a length is not kept, and the ball is not straight on the wicket, the bowler loses his best means of keeping the score down and his opponent on the alert, not to mention a possible l.b.w.

A straight ball defines itself; it is one which, if pitched on the wicket and not interfered with, will hit or pass over the wicket. A good length is less easy to define, since it depends on so many uncertainties. A length ball must pitch perhaps two yards nearer to the popping crease on a slow, wet wicket than on a fast, true one; again, this is qualified by the speed of the ball. Fast bowlers on a good wicket usually aim at a spot about 5 to 5½ yards short of the popping crease; but they are also guided by the height and reach of the batsman. Medium bowlers aim about a yard nearer, slow bowlers another half a yard or even more up to the wicket. The best way in which consistency can be attained is undoubtedly by practising at a mark, say a chalk spot or a paper disc, and to keep on bowling at it until one is reasonably certain of hitting it. The problem is precisely the same as the fundamental problem in billiards, except that the surface is so very much rougher even on the best of pitches; but the accuracy with which such first-rate bowler as Voce (fast), Bowes (fast) and Verity (slow) could keep a length hour after hour was really remarkable. All these bowlers would readily admit that they owed that accuracy to constant practice. The length ball, whatever its character—whether it rises sharply from the pitch or shoots along close to the ground—should after

pitching hit the wicket; hence the batsman *must* stop it or see his stumps uprooted, also he must stop it when it has attained an awkward height. It keeps him continually on the alert, besides giving the bowler a chance of slipping in a swerving or a break ball unexpectedly when his opponent is expecting another straight one.

The length of the run up to the wicket is very largely a matter of individual taste, except that some fast bowlers take what appears to be an unreasonably long run. In any event, the ball will acquire most of its velocity from the action of the arm just before it is released; but it must never be jerked or "thrown". (Over-arm bowling, by the way, was all spoken and written of as throwing, little more than a century ago.) A jerky action from wrist or elbow is definitely a throw, and constitutes a No-ball. Aim at a loose and easy run-up, followed by an even, easy, complete swing of the arm; and never bowl at the limit of your strength.

Next comes the important matter of disguising one's pace. It is most valuable to be able to vary one's pace, a matter within any bowler's capacity, but it must also be done so that the batsman cannot tell until it is too late, and that is not easy. It rests upon letting the fingers hang on to the ball just a fraction longer, so as to check its velocity a trifle. To get the batsman accustomed to two or three fast-medium balls followed by a real fast one, is to make a real effort to capture his wicket. Some first-class bowlers can vary their pace very much with scarcely any change of action.

Having mastered straightness, length and pace, we come to the more difficult questions of break and spin. The "leg" side of the wicket is the one which is, partially at any rate, guarded by the batsman's leg. In the case of a right-handed batsman, the leg side is on the wicket-keeper's left hand, and any ball hit on that side is said to be hit "on"; the other side is the "off". With a left-hander the opposite applies. Assuming, however, that the batsman is a right-hander, a leg-break ball is one which, though not directed straight at the wicket, breaks in towards it after pitching on the left-hand or leg side; whereas an off-break ball pitches on the right-hand side of the wicket, as seen by the batsman, and breaks from the off; such a ball is said to "break back". Left-handed bowlers, by the nature of their delivery, usually have a natural break from the off; but of course, if bowling to a left-handed bat, this becomes a leg-break. It is much easier in general to make a ball break from the off than from leg, unless the bowler succeeds in finding

a "spot". Bowlers also favour the off stump because of the right-hander's tendency to cock up a catch from such a ball into the slips.

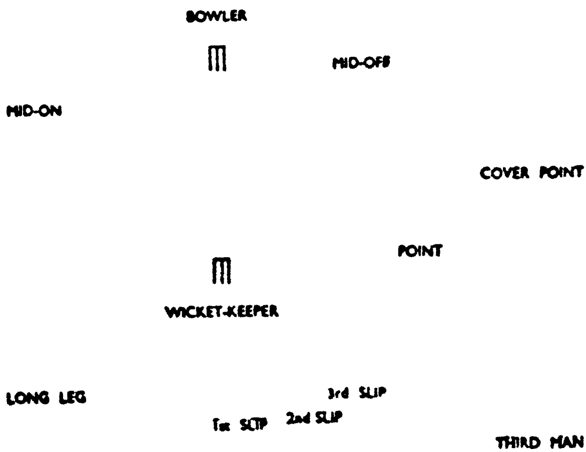
When approaching the crease, some bowlers prefer the left side of the wicket, others (having of course instructed the batsman beforehand) keep to the right. Whether one bowls round or over the wicket, it is well to keep in mind the sound advice of William Clarke, one of the greatest bowlers on record: The bowler, said Clarke, should bowl from the very end of the crease, for the ball then has to travel across the wicket and is more deceptive.

To acquire break, one must make the ball rotate in flight, by a motion of the fingers at the moment before delivery. It does not matter very much which finger is used. The action is made easier by holding the seam of the ball with the finger in question. An off-break is obtained by making the ball rotate from left to right, and at the moment of release the finger and wrist should be turned outwards, with the back of the hand towards the ground. For a leg-break the ball is held lower in the hand, so that the third and little fingers can give it a twist from right to left, and this means that the back of the hand must be uppermost. The effect in both cases is precisely the same as one gets with a billiard ball, by imparting right-hand or left-hand side to it: when it strikes the object-ball (or in the case of the cricket ball the ground), its tendency is to turn in the direction in which it is rotating.

A spinner, on the other hand, is a ball which has a forward motion in the direction of its flight; and—here again the analogy with a billiard ball is perfect—it tends to go on with increased pace after it has struck the ground; thus a batsman who has perfectly judged the pace of the ball through the air, and has shaped himself accordingly, may be completely deceived by the spin. To impart spin to a cricket ball, and at the same time maintain one's length and direction, is an extremely difficult thing, and beginners are not advised to waste time on it.

On the whole, fast bowlers depend mainly on an accurate delivery and sheer pace, and it is a not unterrifying thing to have to stand up to a flying fury at the other end, who shoots the ball at you with the speed of a cannon ball. No good fast bowler, however, would be so foolish as to send down his fastest stuff to a boy. A series of fast balls breaking from the off, followed by one that breaks from leg, may uproot the stumps; and here again, as in slower bowling, variety always pays.

Medium bowlers bowl all sorts of stuff, as indeed do most bowlers at times. The slow bowler, however, is to the author's mind the real master of the art, for he alone can do everything that is possible with a cricket ball; and all the time the batsman is kept guessing, for if the bowler be good no two successive balls will be alike. Years ago it used to be a real delight to watch Colin Blythe, of Kent, tie up the opposition on a wet wicket and send a succession of first-class batmen back to the pavilion, not one of whom could



Field set for fast bowler

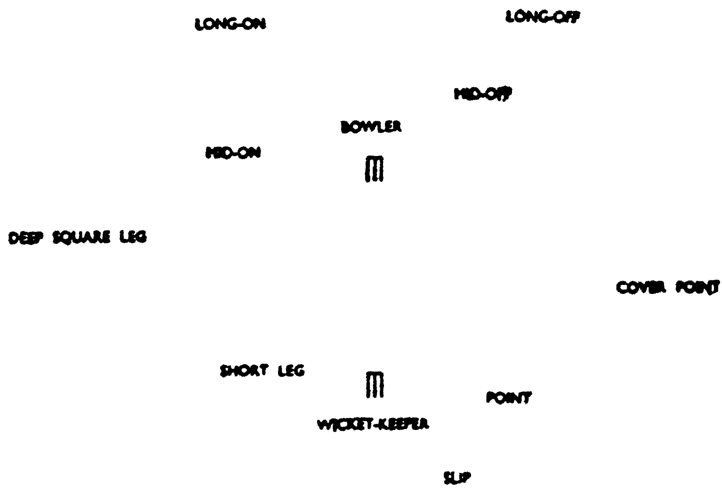
attain double figures. As the slow bowler allows the batsman so much more time, it is absolutely essential that he should mix his bowling and yet make it all appear alike. This comes only with constant practice and training oneself to make different motions with the fingers without apparent change. A straight ball, two or three balls that break to a given extent, and then one which breaks just a little more or a little less, are apt to be unnerving to the opposition, who, with slow bowling, is usually afraid of giving an easy catch.

Underhand bowling is apt to be laughed at, but it can be exceedingly deadly, and once a rot has set in a whole team may succumb to it. It rarely appears in first-class cricket in these days, the more's the pity. An underhand or lob bowler with a high delivery can get up a terrific and quite unexpected pace on the ball; if he bowls

slows, there is an itch of one's fingers to knock the ball out of the ground, followed as a rule by "skying" it and giving somebody an easy catch.

All slow bowlers should bowl, as a rule, well up to the wicket. It is always good policy to drive a batsman back on his stumps. If he comes out fiercely, however, and can see so well that he repeatedly gets the ball away, it is better to change the bowler.

One of the greatest, if not the very greatest, of slow underhand bowlers was G. H. Simpson-Hayward. Sir Pelham Warner tells us

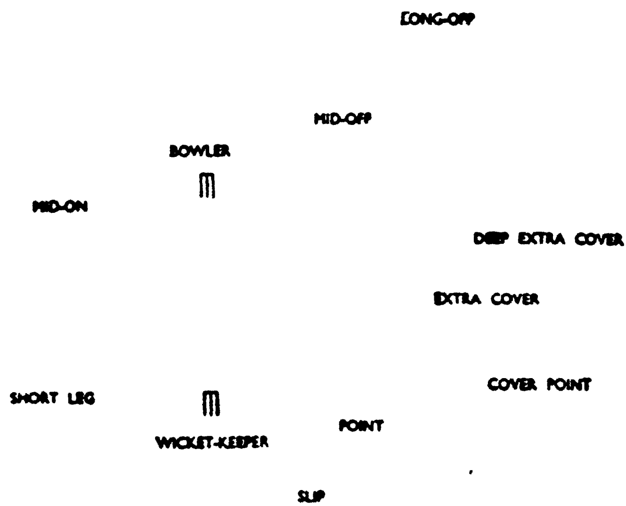


Field set for slow right-hand bowler

how, in a Test Match against South Africa at Johannesburg (1909), the crowd roared with laughter when he went on; but they thought differently when he took six wickets for 42 runs! His methods were those we have briefly indicated above—an infinite variety of attack, several different off-breaks, and a straight ball, coming from fingers which to the batsman must have appeared the same each time. He also had a great deal of finger spin, and indeed insisted upon this as a feature of his success. He developed it by spinning a billiard ball with his fingers, to strengthen them. Then he practised getting a length, which took him three years to perfect. Some of Simpson-Hayward's maxims, like those of Old Clarke, should be engraved

on the bowler's heart: " Risk something to obtain a wicket and try to deliver different kinds of balls with the same action. Do not bowl a new ball in a match until you have got fairly proficient with it at practice. Keep your head, keep your temper, try to defeat your man."

The reason for disliking a new ball is that it cannot be made to twist until its surface is roughened, since it slips in the fingers; but there are occasions when things can be done with a new ball and a new ball only. A new ball, advancing through heavy air, has



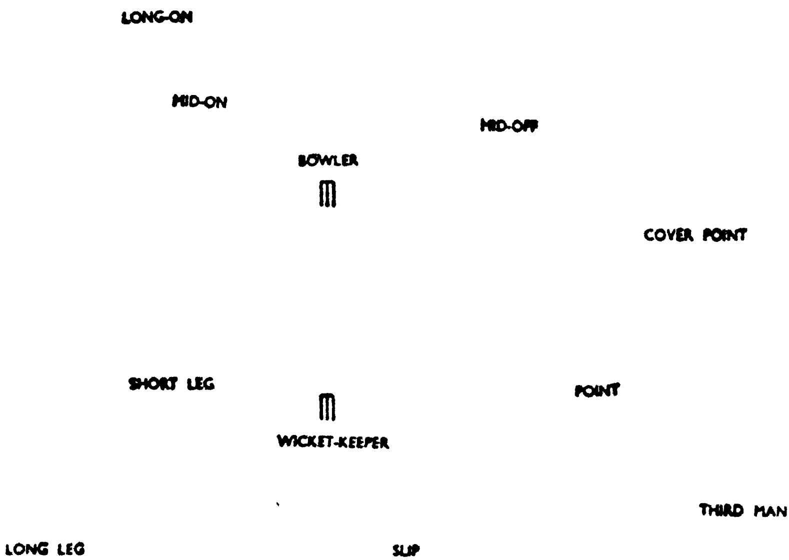
Field set for slow left-hand bowler

a natural tendency to curl, so that when it is hit it goes up and a catch results. The bowler then places his field so that he has a whole army of men on the side of the wicket facing the direction of the wind, for of course a wind aids the effect. A swerving ball which drops suddenly may also bring about a batsman's dismissal l.b.w. Balls of any pace can be made to swerve, if the ball is new and the conditions favourable.

Although the reader of these lines is not likely to become a googly bowler, he should at least know how this most perplexing ball is delivered.

The googly is a ball which, delivered with the action of a leg break, really has its direction of rotation reversed at the last instant,

so that it comes off the pitch as an off-break. In a dry, clear climate, like that of South Africa, or even in Australia, it is exceedingly deadly, because it is impossible for the batsman, watching the bowler's hand, to be certain which way the ball will break until it pitches. The googly was invented by B. J. T. Bosanquet, a famous England amateur, more than forty years ago; and for a long while very few bowlers could bowl it. But the South Africans before the



Field set for googly bowler

First World War—especially G. H. Faulkner and A. E. Vogler—and later the Australian Mailey and the Englishman D. W. Carr, mastered its secret with great success. To-day googly bowlers, though not numerous, are fairly common. In an ordinary leg-break, the bowler, as has been said above, makes the ball rotate with the aid of his fingers just as it leaves his hand, the direction being from right to left for a right-handed batsman. By dropping his wrist at the moment of delivery, the bowler of a googly reverses the direction of the spin so that the ball on pitching will break back. It is not at all easy to detect this drop of the wrist from the batsman's end. Bosanquet used to assert that with persistence and practice anyone

could bowl googlies; but most of those who have mastered this ball have had to spend a very long time on the task.

Not the least important duty of a bowler is setting a suitable field for different batsmen or for the same man at different times. To do this successfully, he must know the batsman's weak points and have a plan of campaign for exploiting them. It is no use bowling at the wicket in the hope of hitting it; and yet this happens only too often, for as a caustic player once said, some bowlers seem to forget that they have ten men in the field to help them. A few more or less typical fields for different types of bowling are shown in the diagrams; but of course every bowler must vary his field to suit the actual circumstances, and in this the wicket-keeper should be consulted, because he alone of the fielding side can command a comprehensive view of the game. For the same reason, it is ideal when the captain is also the wicket-keeper.

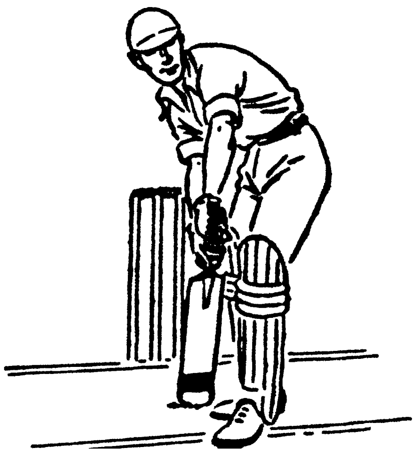
It will be noticed that a fast bowler usually needs several slips, besides a fast man far out at third man, batsmen having a marked tendency to snick fast balls off the edge of the bat into the hands of a slip. Another man must guard the off boundary, either as a distant cover-point or as long mid-off. A slow bowler, on the other hand, needs more men in front of the wicket, especially on the off side, for in his case the general tendency will be to hit a spinning ball up and forward. The best lessons in placing a field are unquestionably learned by watching it done in an important first-class match.

Batting.

Although the heroes of old scorned the use of batting pads and probably never thought of wearing gloves, they took many a hard knock and were sometimes seriously injured. Their descendants, the young players of to-day, however, will be well advised to regard both gloves and pads as essential; a precaution which is observed commonly enough in respect to pads, but gloves are still too often forgotten, until one has received some hard raps on the knuckles. This advice to study protecting yourself has been borne in upon the author for many years, he having a young friend who has been permanently crippled because as a boy he took a hard blow on the shin-bone from a cricket ball while batting.

Naturally a schoolboy's cricket bat is his proudest possession, especially if it be one of those well-made willows which bears the stamped imprint of Jack Hobbs or some other celebrated professional.

The choice of one's bat demands some study. It must be suited to your size and strength, well balanced before everything else, but also within your capacity to grip the handle completely round and to swing the implement with ease. Never buy a bat that is too heavy for you, or one that you cannot grip. A rather long handle is an advantage, because it affords more leverage, and one that is sheathed in rubber assists those who tend to get moist hands. There should be plenty of thickness towards the bottom of the bat. Practise handling your bat both indoors and out, and particularly aim at



On guard

flexibility of the wrists, since many a wristy stroke may come your way later. Since good bats are expensive they should be properly cared for. A coat of unboiled linseed oil from time to time helps to preserve the wood.

The first thing a batsman is taught at the nets is how to stand properly. His stance should be easy and unconstrained; but subject to that, he should always adopt the standard posture for batsmen on guard. Never be deceived by some great player who may stand carelessly at the wicket, with his bat over his shoulder (some of the very greatest batsmen have had this habit), but follow the drill faithfully; you will indeed be good if you find that you can ever safely do without it.

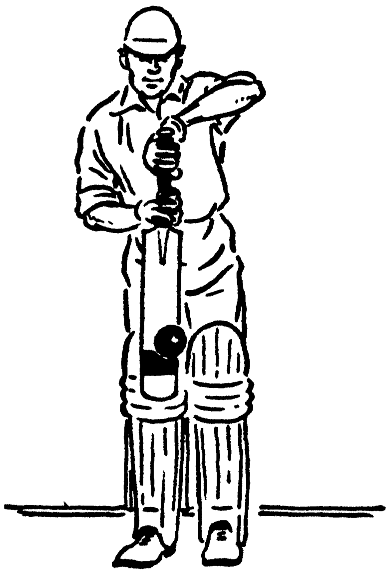
On taking up your position at the wicket, first take guard so as to mark the place where you wish to stand; this should be sufficiently

far from the wicket to avoid hitting it. Place the bat upright in front of the middle stump (or if you so prefer it, between the middle and leg stumps); the umpire will signal to you whether it then covers the stump or stumps. When he indicates that it is right, mark a light block for the bat and take up your position. Do not dawdle, but on the other hand never hurry. (Remember Bradman, who always seems to be a long time in approaching the wicket, with the aim, it is said, of getting his eyes accustomed to the light.) Your most important limbs as a batsman are your right leg and right arm. The right leg should take most of the weight, and be quite rigid and firm; yet not so fixed but that you can move it quickly if you wish to play back. The right foot should be parallel to the popping crease, with the toe as close as possible to the tip of the bat. The left foot should be thrown forward, and the left shoulder in line with it, with the elbow well out. You will lean forward from the waist, and look straight at the bowler. The right hand should grip the bat firmly round the middle of the handle, with the thumb forward and all the fingers wrapped round the handle. This arm is the striking arm, and from it the weight of the stroke must come; the left arm merely gives the stroke direction. The left hand should grip the handle rather less firmly, and an inch or so from the upper end.

You will be told, when at practice, again and again to keep your bat straight. This attitude is absolutely essential; even fourth-rate batsmen are most difficult to dislodge, if only they keep a straight bat, by which is meant holding it so that the face is vertical to any ball; balls that touch such a bat drop harmlessly, even if the batsman does very little else than stop them. If you want to hit the ball along the ground, either back towards the bowler or in the direction of long-on or long-off, the handle should in fact be tilted forward, i.e. it must be nearer to the bowler's end than the tip of the bat at the moment of impact; a ball so struck cannot rise.

The correct stance at the wicket, though easy to acquire as a pose, is by no means easy to *retain* when striking; yet on most occasions you must maintain the face of your bat vertical to the ball, and you will soon learn that this frequently places a good deal of strain on your wrists, which persist at times in getting in each other's way. What happens to a man who has not a straight bat is best seen by considering the action of a " mower ", or a fellow who hits across the ball. (Hammond, one of the greatest cricketers in the

world, sometimes hits across a ball; but Hammond is exceptional, and is not to be judged by the ordinary standard.) With a cross or mowing stroke, one hopes to hit the ball when in mid-air, without knowing exactly how many inches it is above the ground, or indeed anything else about it; and if one hits it at all, it may catch the edge of the bat and drop into the waiting clutches of a fieldsman. The cross bat also obviously protects no more than 4½ in. of the



Backward defensive stroke

wicket; the ball may pass over it or dive under it. A straight bat, on the other hand, protects the whole wicket. Therefore persevere at acquiring this habit, and you will be duly rewarded.

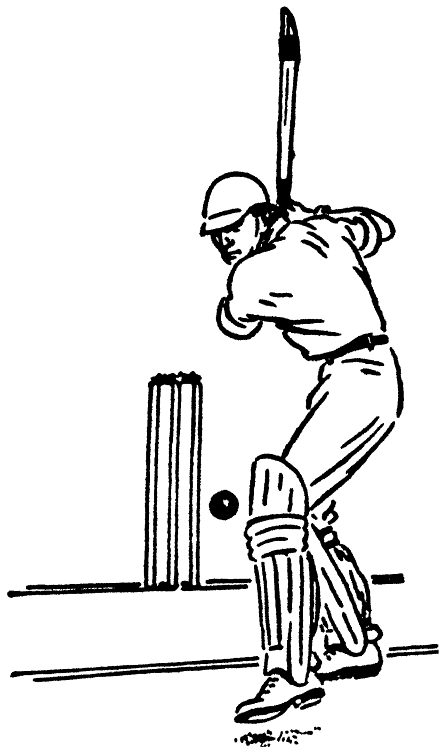
Good eyesight is likewise a great asset to a batsman. It is no use swiping blindly at a ball if you can scarcely see it. True, there have been first-class cricketers who wore spectacles—P. G. Fender, the captain of Surrey and England in many a fine game, was an example; but they are exceptions. Nearly all the greatest batsmen—Hobbs, Ranji, Grace, Fry, Hammond, Jessop, Bradman—have been men of exceptionally keen vision; and when, in addition, the player

is very quick-witted, he seems to have an uncanny knowledge of what the ball is going to do, whereas what really occurs is that he has watched its entire course and shaped for it accordingly. That mighty hitter of yore, Gilbert Jessop, had a wonderful eye and would run out to, and soundly punish, all manner of balls in his unorthodox way; this would have been impossible but for his perfect sight of the ball. No bowling is more perplexing or deadly, when accurate, than the googly; yet J. B. Hobbs, who played it with the utmost confidence, admitted that he never knew which way the ball would break until it did so; but he watched it *all the way from the bowler's hand* to the bat. In the very fine series of photographs taken some years ago by G. W. Beldam, of famous batsmen in action, every man of them has his entire attention focused on the approaching ball; and beginners can hardly do better. Watch, then, the motion of the bowler's arm as he raises it to deliver the ball; if you know him, you may detect by his finger action if he is going to make it spin; if you do not know him, you will very soon find out, but study his every movement, just as you may be sure that he is studying you. And keep your eyes on the ball from the moment it is released until you either hit it or feel it whip harmlessly past you. This is particularly vital when dealing with fast balls, for then a split second may make all the difference between hitting the ball and having your stumps spreadeagled.

What types of balls are you liable to receive?

First there is the half-volley, which is generally accounted a gift to the batsman, and a ball from which he should score. (By the way, one cannot possibly score off every ball; one must learn—by the hard way of experience, I am afraid—that certain balls have to be left severely alone and others simply blocked.) The half-volley encounters the bat immediately after it leaves the ground. The batsman should have in his mind's eye at all times a picture of the field, so that he can try to direct the half-volley away from a fieldsman to the boundary. He steps quickly forward with his left foot, keeping his elbow well up (which means that his bat must be straight), and smites the ball where he may. To hit it back to the bowler is of course a mere wasted opportunity. Length balls, of course, can be made into half-volleys, by playing forward and running out at them; but this demands both skill and confidence and is not recommended to tyros at batting. Normally, the beginner should stay within his crease, but always be ready to turn

on his right foot as on a pivot, so that he can step forward, or to the off or the on, with complete freedom; nor must he hold the bat passively—it must strike the ball decidedly, even venomously, and even if his intention is only to strike it down. Standing thus, ready for anything, two courses are open to our young batsman, to play

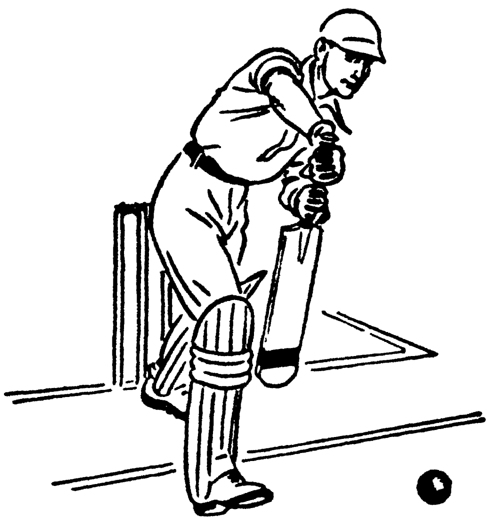


Short half-volley

forward by stepping out with the left foot *in the line of approach of the ball*; or to play back and hit it when it nears the wicket. Some batsmen are naturally the one type, others favour the other; it is somewhat a matter of temperament, but a good batsman should be equally adept at both styles.

The next ball that he is liable to receive is the length ball. This ball pitches sufficiently far away to make it difficult for him to reach it merely by lunging out. The pitch, of course, depends on the pace

of the ball, being a yard or perhaps even two yards farther from his bat if a fast ball and correspondingly up if it be a slow one. The bowler's aim in bowling a length ball is to compel the batsman to raise his bat to it; if he misses it, it should either pass over the wicket or scatter his stumps. In raising his bat, he must keep it straight, or as straight as possible, otherwise he will inevitably cock up a catch. Length balls are always difficult to score from, and to



Left-hander playing forward

attempt risky strokes against them commonly results in dismissal. If the bowling is fast, it is good policy to play forward to them, bringing out the bat almost against the left leg, which is as far over the crease as you can get while maintaining your balance. If they are medium or slow, it is probably better to play back, carrying back the right foot close to the wicket, bringing the left leg well across (but not so as to lose sight, even for an instant, of the advancing ball), and make your stroke almost above the stumps. Sometimes a bumpy wicket makes such back play very awkward, and bowlers often pitch the ball farther and farther up with the aim of making the batsman either tread on his wicket or snick a catch into the wicket-keeper's hands. Remember to keep the left shoulder well

out and the left elbow up; and at the moment of impact the handle must point away from your own wicket and towards the bowler a little, if you wish to avoid giving a catch. So far we have been considering straight balls only, on a plumb wicket; and throughout these notes it is assumed that right-handed batsmen are opposed to right-handed bowlers, unless the contrary is stated. But wickets



Back play

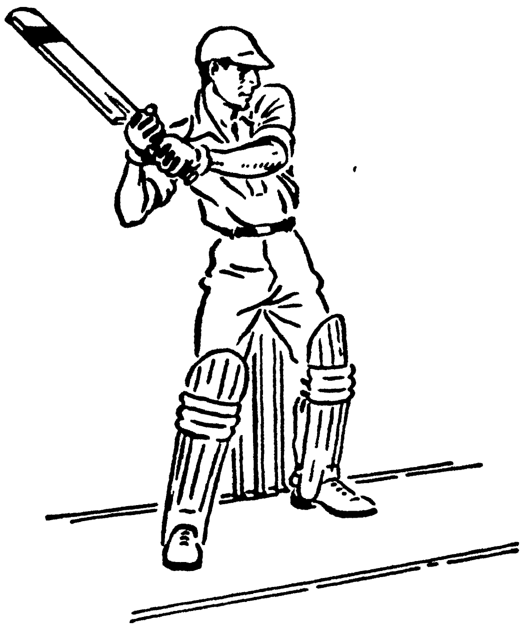
are often bumpy, and then the ball may pop up almost anywhere; then, and on slow, treacherous, wet wickets, it is soundest to play back, making the stroke only at the last instant, and mainly by the work of one's wrists.

It follows from our remarks that if a bowler consistently maintains a good length he will keep the scoring down; but that cannot be helped. Sooner or later he will put up an easy one, and meanwhile the batsman must bide his time. He should particularly resist any temptation to smite a wide ball on the off side which is within reach, for the chances are that he will mishit it and be caught out.

A length ball which turns into a "shooter" frequently brings

about a batsman's downfall. Such a ball, after pitching, hugs the turf, shooting along straight for the stumps; and woe betide him if he has lifted his bat in the expectation of the usual rising ball. True, these shooting balls frequently miss the stumps, but the batsman feels morally bowled all the same.

A yorker is another dangerous ball. It pitches far up, some-

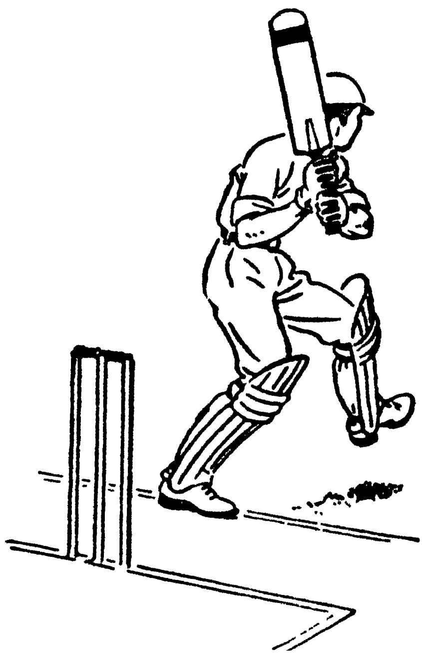


The pull stroke

times even beyond the popping crease; and the inexperienced batsman will almost certainly succumb, especially if the ball be a fast one. But if he keep his weapon low down, handle forwards, he can knock the ball down and away, or deflect it to midfield. More alarming still is the full toss, which does not pitch at all, but must be hit, if hit at all, while in full flight. If it is coming down on the wicket, watch it on to the bat and deflect it *downwards* by a cut through the slips, or glance it away to leg—both difficult strokes. The natural reaction is to drive it straight back; but such balls are usually too high to hit properly, except by first-rate men. A high-flighted ball could be pulled, but this stroke requires long knowledge

of batting, a nice sense of timing, and considerable strength. Most players duck and hope that the ball will pass over their heads.

Then there is the long hop, which may be fast or slow, but is most usually slow. Few things are more tantalizing to a batsman than to stand watching such a ball bounce several times, uncertain just where it will make its final flight. The best way, if not the only

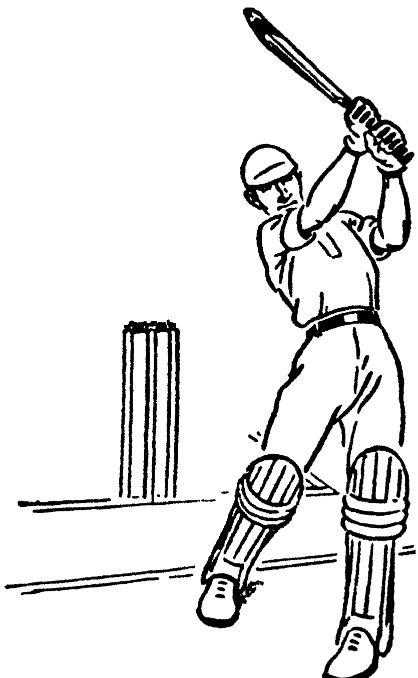


Jumping out to drive

sound way, in which to treat such balls is to run out and drive them towards the boundary; but even then the aim should be to keep one's bat straight and the ball down, otherwise it may be found that the dawdling ball has enough spin on it to curl up gracefully into the air and down into the hands of a waiting fieldsman. In running out to drive, the bat should be raised as if you really meant to hurt somebody, the shoulders loosened, and all your force put into the blow, keeping your eyes on the ball all the time, or you may miss it and be stumped. To direct the ball to gaps in the field requires skill and practice, but the ball will travel, if driven true, at

right angles to the face of the bat. The majority of balls that pitch on the off are driven straight or on the off side; but by sweeping the bat round horizontally they may be hooked to the on boundary —if one is not caught in the process.

Underhand bowling is so rarely met with that when it does crop

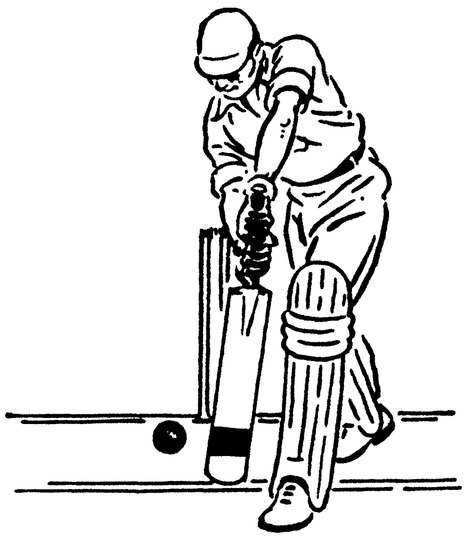


Finish of drive

up batsmen are apt not to know how to deal with it. It is fatal to despise it, because it may be deadly. There are two ways of dealing with this kind of bowling, which is sure to be full of guile. One is to play back, and make defensive strokes, watching the ball on to the bat; this is usually disastrous in the long run, and it scores nothing. The other is to run out and knock the bowler off his length; and on the whole, that course is preferable. It is sound common sense that unless the state of the game and the pitch demands severe restraint, boldness pays at batting. The only un-

forgivable sin in a batsman is to be caught in two minds when the ball arrives, for then his fate is certain.

The danger from breaking or spin balls varies enormously, of course, according to the state of the wicket and the bowler's skill; a good bowler on a crumbling wicket, or a wet one, can make the ball do everything but dance, and on such occasions bowlers have frequently dismissed county teams for a mere song; but normally the break ball should not be feared, if you watch it and face it all



Forward defensive stroke

the time; nor need you defend your wicket only by passive back play, but by putting the strength of your arms and wrists into a forcing stroke played back, you can get the ball away on the appropriate side, and even occasionally cut it. In dealing with a ball which breaks back from the off (the commonest occurrence), the right leg can if necessary be moved across the wicket, but is best left as a pivot, the player turning on his toes; the left leg, on the other hand, should be carried well across the wicket, with the bat close to the body, and all the power of the stroke directed into one's wrists. It is essential to have the left leg and left shoulder in line with the course of the ball *after it has broken* and before it is hit; in other words, be sure of the direction that the ball is taking before

you strike, otherwise you will almost certainly mishit it or miss it altogether. Balls that break from the off should be hit to the off, at least by beginners; experts have no difficulty about placing them on the on side. If a ball on the off side suddenly spins away, leave it alone. When opposed by a left-handed bowler, one should expect off-breaks, for that type of ball comes natural to a left-hander. When you know that the bowler is crafty, and he has sent up a number of simple off-breaks, look out for the sudden ball which will come across the wicket and break from leg, a common enough trick that has upset many a man's batting average.

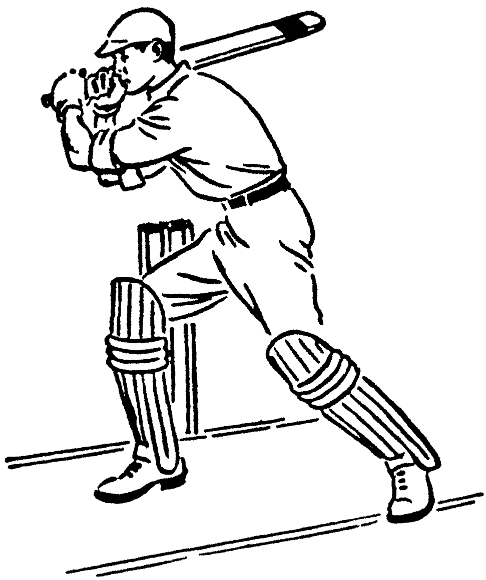
Balls which break from leg are much more difficult to deal with. The general rule is to step back, placing the right leg across the wicket, which it almost covers; the left leg also goes back, but not so much that you completely face the bowler, and the bat is kept well down beside it; remember, too, that you must see the ball with both eyes if you wish to hit it. The natural stroke, of course, is towards deep square leg; but if you are a fraction late, raise the bat, handle forward a little, and let the ball hit it, so that the ball is knocked back to the ground. Such a stroke is called a half-cock.

On many a wicket the ball is made to break within a very narrow radius. Do not get into the habit of regarding that as the only danger spot, or the bowler may trick you by a ball which suddenly breaks much farther up. Many leg-break balls are played off the pads, and runs scored for a bye.

We have spoken of boldness in a batsman. This is particularly necessary when dealing with fast bowling, which, unless of high quality, has more speed than guile. As a rule, always play forward to a fast bowler and endeavour to knock him off his length; if the bat is held straight, a mere touch to a fast ball will send it flying away, and you should collect many a cut somewhere between point and the slips. Only balls pitched well up on the off side should be cut. To make a cut the bat is thrown out sideways just as the ball is passing, and chopped downwards with the upper edge towards the bowler; thus when the ball hits it, it not only flies off at an angle, but is at once deflected to the ground. A late cut is similar, but much more difficult to make successfully, because in that case the ball has actually passed the batsman and he requires great quickness in turning, in order to reach it.

It is a moot point whether a batsman should or should not remember the score-board. If he stands early in the batting order,

he should not think about the state of the game at all, but play his natural game and hope for the best; but if he is lower down, and a stand is necessary, his temperament alone may make him anxious, and anxiety may cause him to make a false stroke and lose the game for his side. Others, on the other hand, play best when things look their darkest. The one essential is, never be frightened of the bowling; but if you cannot hit it away, at least keep up your wicket,



Square cut

so that your partner may have a chance. A man who stays in for an hour, and scores only three or four runs, may be doing invaluable work if his partner is able to score freely, and the game demands it; but to potter about on the defensive, early in an innings, is inexcusable. One should always be on the look-out to score, even when it is most difficult to do so. A memorable case occurred in the 'twenties, during a hard-fought Test Match against Australia at the Oval. Hobbs and Sutcliffe, England's most famous opening pair, went in against a huge total, on a wicket that had been drenched overnight and which was drying; and it was expected that the whole side would be out for 100 or less. But by defensive play the

pair succeeded in keeping together all day, until the wicket improved; and they never lost a chance of a short run or a neat single, until they had mastered the bowling.

This brings us to the question of running between wickets. The non-striker must invariably follow up, taking care, however, not to leave his crease until the ball has actually left the bowler's hand; nor should he get so far up the pitch that if the ball is struck back to the bowler he cannot regain his crease. An understanding with the partner who is batting is essential, likewise mutual confidence. No run should ever be attempted if there is no real chance of making it; this is simply to throw one's wicket away, yet in the heat of action it is done almost everywhere. If the ball is hit behind the batsman, or if it passes him for a bye, his partner should call "Run!" or "Come!", he being well up the wicket and the ball having a long way to travel to the other one. On the other hand, if the batsman hits the ball away in front of him, it is *his* right to call for the run. Either batsman may refuse the call, but it should be done instantly and loudly; just the word "No!" should suffice. By adopting the same code rigorously on all occasions, many misunderstandings on this score may be avoided. There is no sense in running short, so see that your bat is grounded within the crease before you turn for a second run; and by the way, when running do so as hard as you can, and you may score a couple where a less energetic pair would be content with a single. Of course, if one player is a much better bat than the other, the state of the game may demand that he should collect all the bowling; and it then pays to run singles rather than let the weaker player risk being dismissed.

Stolen runs are a delight to the spectators and a source of glee to the batsman; they also rattle the field more than anything else. If men understand one another, the ball can be hit a few yards down the pitch, followed, passed, and the crease gained before the wicket-keeper or other fieldsman can get to it. This chance occurs often and often, but alas is just as often allowed to pass because the batsmen have not sufficient enterprise.

In the case of an overthrow it is pretty safe policy to run, because the ball, having missed the wicket at which it was aimed with more force than judgment, will most likely go on to a vacant place in the outfield before it can be gathered.

Always run wide of the wicket and clear of your partner, with the bat well out in front, so that it can be touched down at the

earliest instant; the pause before you turn to run a second time should be almost unnoticeable. What commonly occurs, of course, is that one runner is much faster than the other, and in addition the non-striker should have some start; but if they both took equal pains over their running this disparity would be much less as a rule.

For a left-handed batsman most of the foregoing remarks must be reversed. Such players are a great asset to the batting side, because bowlers as a rule bowl to the off stump and must consequently bowl across the wicket to a left-hander; also, of course, the field does not like continually changing position. Left-handers are forceful, punishing players naturally, on the whole. F. E. Woolley, for many years the darling of the Kent crowd, was one of the greatest and most graceful left-handed batsmen in the world; A. P. F. Chapman, many times captain of England and Kent, was another, and when the two were partners the field was apt to wear a worried look!

Fielding.

Many junior cricketers regard fielding as a necessary but unfortunate penance between two innings; this is quite a wrong attitude, for fielding is every whit as important as batting, and although leather-chasing may be exhausting work, yet there is supreme satisfaction in making a difficult catch, especially if it is one with sting in it. Study to improve your fielding, therefore, and do not be content to stand with arms akimbo and legs wide open, wearily waiting for someone else to put the other side out. Good fielding is the essence of team spirit, and when done by first-class men is so machine-like as to make run-getting quite a problem.

The first problem is to learn to catch. Some people seem able to catch a ball naturally, to others it is difficult. Practice between overs, before the game, and at any other time, is helpful. Whatever the force with which the ball comes to you, the hands must yield to it immediately after impact. In a two-handed catch the palms of the hands should be together, with the fingers outstretched, and as the ball is felt, let it sink in by yielding a little, otherwise it may spring out again. Success can come only through practice. For single-handed catches, you should try with either hand, and not be dependent on one alone, otherwise you will be " blind ", as it were, on that side. If the ball has been skied, try to get under it before it falls, and preferably beyond it. so that it drops naturally into

your hands. The fieldsman nearest where the ball will fall is the one who should attempt to catch it. Whenever feasible, the hands should be close to the body, so that if the ball jumps out it can be hugged. Watch the ball at all times, though in making a catch sideways, when the player has to leap into the air, the actual grab is more or less instinctive. Do not be downcast if you miss a catch; it has happened to the greatest players, but do not err again if you can help it. Always bear in mind that missed catches have lost more matches than anything else.

Throwing-in is also largely a matter of practice, but throwing the cricket ball, a field sport, should help. In throwing, throw low, for the simple reason that if you throw the ball high it has half as far again to travel, and of course that takes more time. The throw should be with a jerk of the arm and shoulder, and not the long sweeping motion which a fast bowler makes; yet the pick-up and throw-in should be a continuous action. If the distance to the wicket is beyond you, aim so that the ball will bounce once. If the wicket-keeper or bowler knows his business he will be waiting *behind* the wicket, not in front of it; and you should throw to him, not to the wicket. Consequently, it makes it easier for him to receive the ball if you keep it at least stump high. A good fieldsman, at short range, can easily put down a wicket, and run the batsman out; nor should such a chance be lost if he is quite certain of hitting the wicket; but if he is end-on to it his chance of hitting a single stump's thickness is slender indeed, hence the wisdom of throwing to the wicket-keeper rather than risking an overthrow. A man who is fielding on the boundary, and towards whom a high hit is coming, can run to intercept it, provided that he does not cross the boundary, and can even lean over the boundary line to make the catch; but his feet must be on the right side. When a player is in the long field, and chasing the ball, it is the duty of those nearest to him to back up, so that the ball may pass from hand to hand if necessary, without delay, on its course to the wicket. Another man should also run round behind the bowler or wicket-keeper, in case they miss the throw-in.

Fieldsmen should stand on the alert, with their legs together, and bodies slightly bent forward, ready to move off in any direction the instant they see how the batsman is going to play; the best fieldsmen *anticipate* the stroke, and by running in the right direction may make a catch or save a run, which would be impossible were

they to remain rooted to the ground as so many do. Always watch the batsman and the ball. These remarks do not apply, however, if you are fielding in the slips. Slip should watch the bowler, and should learn by his arm and finger action what kind of ball to expect; because bowlers rely very much upon a snick into the slips, and if the ball is a fast one there is no time to act after the batsman has struck it. Slip should therefore stick to his ground, always with the proviso that he may have to spring to either side to snap up the catch.

It is no good fielding on the boundary unless you can run fast and throw well. It is also no good fielding at point, mid-off, or short leg unless you are absolutely fearless; for the ball may come at you there like a cannon shot.

It often happens that a man in the long field is uncertain to which end to throw in. He should throw to the bowler, unless it is clearly for his side's advantage to aim at the other end.

Next to the bowler and the captain, the wicket-keeper is the most important man in the side fielding. Ames and Duckworth are two of the finest wicket-keepers that England has had in recent times, but Strudwick of Surrey, Lilley of Warwickshire, among the old players, and the Australian Oldfield, gave many a wonderful display behind the stumps. The wicket-keeper should be crouched but not constrained, ready to spring to either side. Lilley recommended that he should stand quite flat-footed when stooping, with the left foot in line with the leg stump. He will collect most balls on the off side, but must always be ready to deal with one from leg, in which case, as the batsman blocks his view of the ball, he has scarcely any time at all in which to think and spring. It is vital that he should always have sound, well-padded gloves, and as he usually gets the full force of the ball he must give it all the cushioning—i.e. yielding grip—that he can. Though he should be zealous, it is a needless annoyance if the wicket-keeper is always knocking a bail down or appealing (as some men do) when there is no real ground for it. For a throw-in, the wicket-keeper must stand behind the wicket, in line with the fieldsman, if he wishes to give the latter a chance. When returning the ball to the bowler, it is sound sense not to make it hard for that harassed player to gather it, especially on a hot day. These are all little things, you may say; yes, but they are the points that make good cricket.

Since the wicket-keeper sees the whole course of most bowling, and how each batsman shapes to this type of ball or that, he is often

able to advise his colleague at the other end how best to bring about a man's dismissal; and such advice should not be resented, especially if the batsmen are set.

The Captain.

The captain of a school team is usually chosen, not only because he is a keen cricketer, but also because he is a natural leader of men; and this is a quality which is born in one. But if his glory is great, his responsibilities are many and arduous; and not the least among them is to be sufficiently lucky to win the toss.

A captain, like Shakspeare's actor, in his time plays many parts. He is commonly consulted about the selection of his team, a difficult and occasionally painful duty, especially where his personal inclinations or friendships clash with his duty to the school; the latter, of course, is the *only* consideration which he should have in mind. Choosing a team involves certain principles that are simple enough in themselves, if players can be found to fill the parts. The best bowlers usually pick themselves; but in addition to the regular pair, regard must be had to one, or preferably two, change bowlers of a different style and pace; and if one of these is a left-hander, so much the better. The opening pair of batsmen also more or less pick themselves. They need confidence and courage against a new ball, but above all patience; remember Hobbs, the greatest opening player in cricket history, who always took some time to settle down; likewise Sutcliffe, who was completely imperturbable in any crisis. The aim of the opening pair is to take the first sting out of the bowling; and they should be selected with that end in view. Numbers 3 to 6 should be chosen mainly for their batting; and No. 11 presumably will be the wicket-keeper; but the conflicting need for good fieldsmen comes in here. If one of the four optional batsmen is a poor fielder, and another player whose batting is weak has earned remark for smart fielding and catching, the latter should be played in preference: it is just as important to keep down the other side's runs as to make a big score yourselves. A left-handed batsman should also be given preference, because his inclusion will upset the fielding side. The captain himself is commonly a good bat, something of a fieldsman, and can bowl a little—in a word, he is a good all-rounder. Walter Hammond is of this type, he being one of the best all-rounders ever seen. This diversity of skill in the captain is most desirable, because some players do not like taking

orders from one whom they know to be weak in any department of the game. There are ticklish problems for the young captain to face at times. If he has to choose between two players of equal merit, and one is a "team man", but the other an individualist, it is recommended to choose the team man every time; for few things are worse than discord or "airs" within a team.

It goes almost without saying that the captain has natural tact: that indeed should be part of his aptitude for leadership. But when he makes a decision it must be obeyed. If his rule is questioned, and the offender, on being appealed to reasonably, persists in his attitude, he should be suspended and reported to the school committee; this is not meanness, but discipline, which is a very different thing. On the other hand, the captain must remember that his authority begins and ends with the match. Off the field, he is "just another boy".

It is essential for a captain to be able to joke and smile with his team. Somebody reported during the 1947 English team's tour of Australia that it would have been better had the captain laughed more, although in the Tests he had little enough to laugh about. It makes the side a happy family; and no matter how bad the position may be, the captain must invariably put the best face on it. Like the bowler who is always going to get a wicket next ball, he must always be about to send in a man who will make a century. Naturally, he may feel very downcast if a match, about which he and his friends have long talked as a certainty, turns out disastrously; but never should he betray his chagrin while the game is on.

If our captain wins the toss, and it has been raining, and the umpires have only just decided to allow play to start, shall he bat first or put the other side in? The answer depends entirely on one's knowledge of the wicket and the character of the opposition. If they are known to be fair-weather men, put them in first, likewise if the wicket is drying quickly and you have a good slow bowler; but if it is likely to be "dead" for some time, then it may be better to bat first oneself, and leave the enemy to sample the anticipated worse conditions later on. If really in doubt, bat first, because in such circumstances boldness is apt to pay big dividends.

If one of the team has a preference for some particular position in the batting order, humour him; remember, it is always an ordeal to face up to strange (and possibly fast) bowling, so why should a player's confidence be shaken by the thought "I never batted so high in the order before"? If a rot has set in, it may be necessary

to change the batting order, so as to send in a stonewaller; and if a left-hander is available who has not batted, he should be sent in at once, so as to upset the other side. Even though he may not trust his own batting ability, the captain himself should step into the breach when necessary, for nothing discourages a team so much as the dismissal of four or five men for a succession of ducks. On a bad wicket, it is often highly important to be able merely to stay there, leaving one's partner to make the runs. Above all, the captain must make his team *think* victoriously. " Nine wickets down; twenty runs behind; only old Jones to bat, and he's certain to fail ", will not do at all. Jones must be taught to think that *he* will make that twenty, and it is cricket history that with sufficient encouragement the Joneses have been known to do it. Of no game is it truer that it is never lost till it is won. Then of course there is the clock. If it has been agreed to draw stumps at a given time, and the hour draws nigh, with defeat in sight, it is perfectly sound play to block and defend for over after over, so as to gain the precious minutes and avert the loss of the game. Some county teams who shall be nameless carry this spirit too far, making the game tedious; but that cannot apply in a school game.

The placing of the field is also a source of much worry to the captain. It is really quite useless to place men " in or about " the normal positions of mid-on, slip, point, short leg, &c. They must be like the meshes of an ever-changing net, moving to suit the bowler's needs, the state of the wicket, and the aptitude or otherwise of the batsman for offensive warfare; and for one single bat it may be necessary to set one's field in several different ways. This is a study which can only be worked out by experience; but after a few seasons, knowledge of the opposition and of the fielding ability at one's disposal should enable a reasonably sound layout of the field to be attempted. If a boy drops a catch, it is no good crying " Butter-fingers ", or he will certainly drop the next one; encourage him to do better next time; better still, remember him, and give him some practice at catching on a future occasion.

When the batsmen get set the captain's problems multiply. If his bowlers have started off successfully, he should not interfere with them for some time; but when the score begins to mount, and before they show signs of tiring, change the bowling. A bowler often finds that he can do better at the other end, and should be given a chance there. Vary the bowling as much as possible; if

necessary, letting your most cunning bowler be hit all over the place for an over or two, in the hope of a catch that will break up the partnership. When two players have been set for some time and the partnership is broken, it is only sound sense to concentrate the attack on the incoming batsman. And so on and so on. Cricket strategy, in a word, is to take all legitimate opportunities which favour your own side.

After 200 runs are on the board, the side which is fielding can claim a new ball, a distinct help to some bowlers, but not to the majority.

In a one-day match, it adds zest to the game when a captain finds himself able to declare his innings closed, leaving the opposition a difficult but not impossible task within the given time. When to make such a declaration depends on all sorts of circumstances and cannot be predicted; but very few sides, batting last, will make 80 to 90 runs an hour. And if the captain's judgment turns out wrong, and his side loses in the very last over, who will complain? It will at least have been a glorious game.

Umpires.

It is very important that umpires should possess half a dozen pairs of arms and hands (like some Hindu gods), the better that they may hold all the scarves, hats, sweaters and other impedimenta which the players so commonly foist upon them. Next in importance is the duty of controlling the game.

A cricket umpire is quite unlike a football referee in his powers. He sets the wicket and after play for the day has ended he removes it. He calls the overs, and he penalizes a bowler for offences against the Laws, and a batsman when he runs short; but in other respects the powers given to him are advisory, and unless he is appealed to he must not intervene. Nevertheless, he is liable to be appealed to on the most diverse questions, so that his knowledge of the Laws must be complete; also, he must be able to interpret them—a very different matter—and to give an instant decision. His impartiality must be beyond question, though whether this is always the case in village games I leave to the reader to find out for himself. In county and international games the umpires are all first-class men; and it is a rule that no umpire may act in a county match where he himself was formerly one of the county's players.

The umpire's decision is final. Right or wrong, it should be

accepted instantly; and it is a slur on any player, no matter how great the injustice, to indicate by gesture or word of mouth while on the field his dissent from the umpire's decision. These words have been printed many, many times; but in these days, when crowds think more of their own partiality than of the spirit of the game, the strictest adherence to this rule should be insisted upon.

There are two umpires because one alone cannot see completely everything which occurs at the other end; but the umpire at the bowling end, who stands by the wicket, has by far the most to do. The umpires are appointed for the two ends, not one for each side.

The umpire at the bowling end has first to decide that every ball is fairly bowled; if he has any doubt at all, he must call a No-ball immediately upon delivery, so that the batsman may have a chance to punish it.

The three worst problems which the umpires have to face are: the fitness or otherwise of the ground for play; the state of the light; and the question of leg-before-wicket. As a rule, the first case arises only in important matches and need not be discussed here; but the wicket must be fit for the bowler to get a reasonable foothold (with the aid of sawdust if he so desires), and for the fieldsmen to move about readily.

On the question of light, a captain will often appeal towards evening, as much because the state of his side's score demands it as on account of poor light. When appealed to, the umpire must decide. If he cannot see the ball clearly from the far end, then presumably neither can the batsman, and the game should be suspended; but as soon as the light improves again, it is the umpire's duty to call upon the players to resume.

The leg-before-wicket problem arises in almost every game. The umpire, who should have watched the flight of the ball from the bowler's hand, has first to consider if the ball would have hit the wicket at all. Did it pitch on the off side or in a straight line between the wickets; and in the former event did it break back sufficiently to hit the wicket? If it hit the batsman's hand or bat first, and his pads or body subsequently, he is not out. If it hit his body first and rebounded on to his bat or hand, and it was a ball that otherwise would have hit the wicket, he should be given out.

The umpire should only appeal to the other umpire when he is unable to decide through having been prevented from seeing the occurrence which occasioned the appeal to him; at all other times,

he must exercise his own judgment unaided. If he is in doubt, the batsman must have the benefit of the doubt. It is within his rights to alter his decision, provided that he does so immediately.

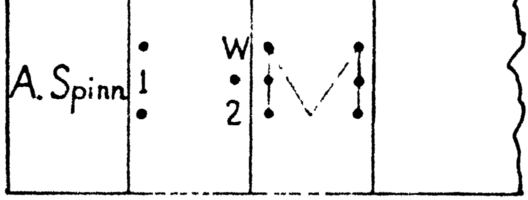
The umpire at the striker's end has mainly to decide cases of run-out, stumping, or the batsman hitting his wicket. In the case of a doubtful catch, it is the umpire at the bowler's end who should decide.

Scorers.

The scorers should be provided with a proper score-sheet. There should be one scorer appointed by each side, to correct mistakes and prevent misunderstandings. They should sit where they have a complete view of the game, and may order away any players or spectators who obstruct their sight of the field. The scorers' duty, if humble, is vital, and demands complete attention to the game. It ought to be made a punishable offence to ask scorers questions, as is so often done, when their minds and eyes should be concentrated upon the wicket.

Presumably all our readers know the umpire's code of signals; but if not, here it is. For a Boundary, a wave of the hand from side to side. For a Wide, extend both arms horizontally; for a No-ball, extend one arm horizontally. When a batsman is out, the umpire raises his index finger above his head. For a Bye, he holds up his open hand above his head; for a Leg-bye, he raises his leg and touches it with his hand. Finally, for a short run, he bends his arm upwards and touches the top of the nearest shoulder with the tips of his fingers.

To record the bowling is quite simple. It should be done for each over, ball by ball. Balls from which no runs are scored are marked by a dot, the ball which takes a wicket by " w ", and the number of runs scored off any ball entered against it; thus:



Records.

Here are a few interesting figures from first-class cricket.

W. R. Hammond headed the batting averages for every year from 1933 to 1939 (except 1934, when he was second). On six occasions he has made two separate centuries in one match.

Jack Hobbs is the only player who has made more than 200 centuries in first-class cricket. He once scored sixteen centuries in a single season; on the other hand, at least once he collected "a pair of spectacles". Hobbs participated in several of the greatest opening partnerships on record. Hobbs and Rhodes, in 1911, made 323 runs at Melbourne; in 1925, on the same ground, Hobbs made 154 runs and Sutcliffe 176. Hobbs and Sutcliffe also made 268 runs for the first wicket against South Africa in 1924. In county cricket, Holmes and Sutcliffe scored 555 runs for the first wicket for Yorkshire against Essex in 1932. Hobbs's highest score was 316 not out, for Surrey against Middlesex, in 1926.

Don Bradman, playing for New South Wales against Queensland in 1929, made 452 not out; and when playing for South Australia against Tasmania six years later, Bradman scored 369 in a single innings. In the same season this marvellous batsman made 357 against Victoria at Melbourne. In 1928 he scored 340 not out against Victoria, and in 1930, 334 against England at Leeds. He is still a batting team in himself.

H. Verity headed the English bowling averages on five occasions between 1930 and 1939, and in four of the remaining seasons he was second. In 1932 he captured all ten wickets against Notts, at Leeds.

In 1912 Colin Blythe captured 178 wickets at an average cost of 12·26 runs; in 1913, 167 wickets at an average of 16 34 runs; and in 1914, 170 wickets for an average of 15·19. He was probably the most deadly slow bowler ever seen. He died in action in France during the First World War.

Wilfred Rhodes, of Yorkshire, figured in the first three places as a bowler no fewer than twelve times between 1898 and 1926, a marvellous record; especially as Rhodes was also a first-rate bat.

Dr. W. G. Grace, champion of all the old champions, made 344 runs for the M.C.C. against Kent in 1876.

Ames and Duckworth have each stumped or caught out more than 100 batsmen in a single season.

It is your turn next!

CYCLING

Those of us who have bicycles and who live in Britain are fortunate indeed. Ours is only a small island, but most beautiful. 865 miles in length and never more than half as much across, we can ride in and around nearly all of it. The trip from Land's End to John o' Groats has actually been done in 2 days 6 hours and 33 seconds. Not that you or I would like to tackle that sort of cycling. There is more fun to be had by being less energetic than the one-eyed vegetarian record-breaker, Sid Ferris. We could be much happier taking two weeks for the end-to-end ride, or, if we could get it, two months.

Not for us the shortest distance between two points. We, rather, would follow the fretted coast of Devon and Cornwall, or spend leisurely days in the ancient cities on our way. We might prefer to travel by the Wye Valley, or ride through the lovely villages of the Cotswolds. We could then choose our way by Snowdonia or *via* the Warwickshire and Cheshire leafy lanes; and, if we did have that two months' holiday, we could " do " both. There is the splendour of the English Lake District, the roads through the passes, with their miles-long free-wheeling, to thrill us. And then we would cross the border, by Gretna Green, into the now peaceful countryside where the sheep can find pasture on the hillside without fear of " the reavers ".

Ferris had his eye on the Great North Road. But that would not be our way, if we had time to spare, and as long as the Bonnie Banks of Loch Lomond still had that twenty-mile stretch of Britain's most beautiful road waiting to welcome us. We would venture through dark Glencoe; take the Road to the Isles; look upon Skye and wonder; ride by the banks of lonely Loch Maree, on into Ullapool, and so north into " wildest Britain ". We would ride over the top of the country, and thus to our journey's end, to the last house on the mainland, to " Groats ".

It can all be done. I have done it. You can do it. Not all at once, perhaps. But one touring ground could be our centre for one holiday, and we could visit another part in another year. And then,

of course, there are numberless other " beauty spots ". There is the Shakspeare country, the Burns country, our cathedrals, Derbyshire and the Pennines, Yorkshire with its rolling dales, Kent, the garden of England; there is London, and the many other places of great historic interest; there are our walled cities of York and Chester; there are Wells, Bath, Stonehenge, Edinburgh. And there are all those pleasant little roads round our own home town, on which we can enjoy an evening's ride, solo or with some of the lads in the youth club or who live in the same street.

Well mounted and decently equipped, we have the " open sesame " to happy and healthy hours spent in a wonderful land.

I was a schoolboy when I began real cycling. That was over twenty years ago. I am just as keen now as I was then. For this I have to thank the man who sold me my first machine. He happened to be a regular cyclist as well as being a cycle agent. That meant a lot. It meant that I got the right sort of mount. Had it not been for " old Jock ", I would probably have been burdened with one of those so-called " safety " bicycles which are sold so readily in this country, and which probably account for the popular belief that cycling is hard work.

The tips and advice I got then, and later, when I joined a cycling club, have been of great help to me. I wonder if, through these pages, you would care to have me pass on some of this advice.

How best can I describe the sort of bicycle which would be most suitable for all-round pleasure cycling? To save time, I have drawn the accompanying sketch (fig. 1). You have seen this kind of machine before. It is called a " racer ", which is a pity, because it is a description which scares away parents. They will not purchase this type of machine. I know that with minor adjustments it could be made ready for a race; but that is something to be said in its favour rather than against it. If there is one thing a racing man needs, particularly a road man, it is a strong, easy-to-ride and comfortable machine. The machine in the picture is the best so far designed to meet that need.

I have put some measurements into the sketch. Notice the one from the bottom bracket A to the ground—10½ in. That is low enough to allow the rider to put his foot on the ground when he has to stop, say, in traffic. That makes for safety. A lad, mounted on the type of machine which was designed in the day of his grandfather, has to engage in the dangerous trick of dismounting each time

the signals say " Halt ", and then of throwing his leg back over the saddle again when the lights change to " Go ". And the low-built bicycle has another advantage: it reduces the amount of wind-resistance the rider has to contend with, and wind-resistance is our biggest opponent.

The frame in our picture is 19 in. in length. That is the most suitable size for a lad in his teens. Some years ago, a friend of mine bought his twelve-year-old son a new machine. On the ignorant

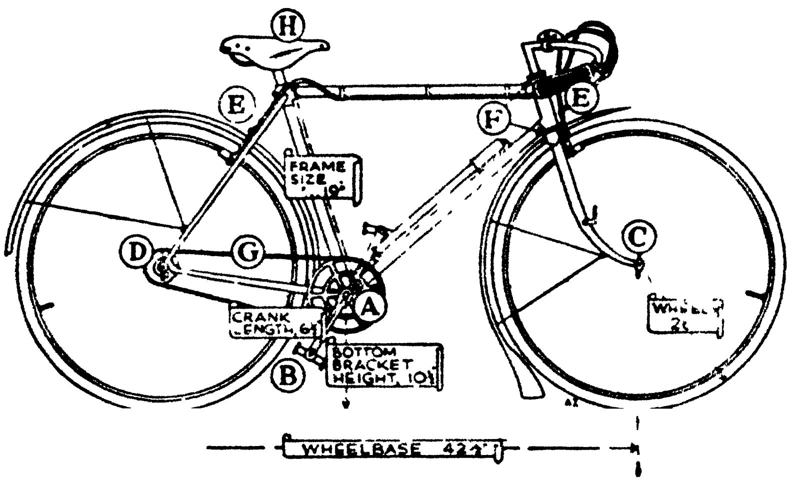


Fig. 1

and almost criminal advice of the salesman, he took home a 20-in. model. The salesman had explained that the youngster " would grow to fit it; and, anyway, the 20-in. bicycle cost just the same as a smaller one ". But it is better to have too small a machine than one which is too big.

Here is the simple way to find the size which best suits you. Take your inside leg measurement, and from this deduct 10 in. If, for instance, the measurement from the ground up the inside of your leg to the crutch is 29 in., a 19-in. frame is your size. As you grow, of course, the saddle and handlebars can be adjusted to keep pace.

The saddle! A tender spot. And, if not properly fitted, a sore spot! Some years ago, I was a judge in a newspaper competition

which invited readers to suggest improvements in the bicycle. More than half of the ideas there submitted were designed to make the saddle more comfortable, or, rather, should I say, less uncomfortable. All sorts of springing arrangements and pneumatic coverings have been tried out, but still the seat continues to hurt. I am not going to guarantee you armchair comfort. But I do know hundreds of lads who have ridden over 200 miles in one day (in 12 hours to be precise), and they have not been unduly troubled with saddle soreness. And during these rides they probably never left the saddle for more than one spell of a few minutes. Those lads took good care in the first place to buy the best saddle they could afford; having got it, they looked after it and, besides, they had it fitted in the right position. Those are the three things to look to.

If we could specify our ideal mount, then, what sort of saddle would we select? In the first place, we do not need to take the saddle which goes with the standard machine. Too many of the seats fitted in the factories are narrower than they ought to be. A " B10 " size is better than a " B17 ".

Don't be afraid of that springless thing, a piece of leather (and, sometimes, pretty hard leather too) stretched over a wire frame; once it has been treated and " ridden in ", it can be your cycling friend for life. But, mark you, if you feel that something with springs in it would suit you better, then have it. As a guide, I say that the boy who intends using his machine for utility purposes and in towns, and the cyclist who tends to sit rather heavily on the saddle, could do with some cushioning. But for touring, for club running, for racing, springs are better done without. The spring has a tendency to keep the leather pressed all the time against the body and causes sweating.

Later, I shall tell you how to take care of the saddle. I would like now to offer you help in finding the best way to set about fixing your seat in the right position. There are two keys to this. The first is the height. What height should we make it? Well, get on the machine and we shall find out. Put the saddle just high enough to allow you to pedal with your *heels* on the pedals. You should be able to do this without undue wobbling. Slacken the nut behind the seat-pin and slide the saddle up and down until you get it into the right position, then lock it. Now of course nobody goes pedalling with the heels. That is the wrong way. The right way is to pedal with the *ball* of the foot on the pedals. When, therefore, you get

into this position, you will find that you have left yourself just enough " play " to be comfortable. But the saddle can also be made to slide backwards and forwards. Where shall we fix it? This is the second adjustment. Our drawing shows a saddle positioned so that if a perpendicular were dropped from the peak, it would pass 1½ in. behind the bottom bracket A. You can test this with a piece of string with a weight attached.

As a last hint on the saddle I would say: it is better to have it too low than too high.

The bicycle in the picture shows dropped handlebars. To the older generation, that is sufficient to condemn it. There is a great deal of prejudice against " droops ", but there really should not be. I have never heard anyone who rode a bicycle fitted with dropped bars say anything against them. But plenty of folk who have never really given them a trial have ventured the opinion that they prevent the rider from seeing where he is going; that they are uncomfortable and that, anyhow, they make cyclists round-shouldered. The first allegation is nonsense, the third is against all available medical evidence and, far from being uncomfortable, dropped bars afford a rider a choice of three positions for his hands and by changing about he can avoid any feeling of cramp. Besides, when a rider has to " get down to it ", when he has to fight a head wind and wants to offer the minimum of wind resistance, the dropped bars are his best ally.

A bar with about 3 in. of drop and about 17 in. in width—take your chest measurement—would be best suited to the average 'teen-age cyclist. Champions design handlebars for their own personal use, but ordinary riders can find what they need from an extensive range of shapes and sizes. Again, I would whisper, do not necessarily take the bars which are fitted to the machine as it is in the showcase. Talk over all the points I have mentioned with the dealer. If you feel that he knows his business, take his advice. Show him this article if you like.

Make your own adjustments as to handlebar height and as to the distance you will position it from the saddle peak. As a guide, start by putting the top of the bar level with your saddle, and be careful that you do not have to over-reach. The more you have to lean forward, the heavier the load you will be placing on your wrists; they'll soon complain if you overdo it! And the higher you raise the bars, the more weight you throw on to that tender spot, the saddle.

Try to divide your weight over the pedals, the saddle and the bars in that order, most of it being on the pedals.

Everything I have said can be made to apply to almost every kind of bicycle. Even if your machine came to you very much second-hand, it can be brought up to date. All the fittings are adjustable. Do not be afraid to experiment. It is not the best and most expensive machines which yield the most; it is those bicycles which are nicely " positioned " and well looked after.

But before I go on to give tips on looking after a bicycle, I would

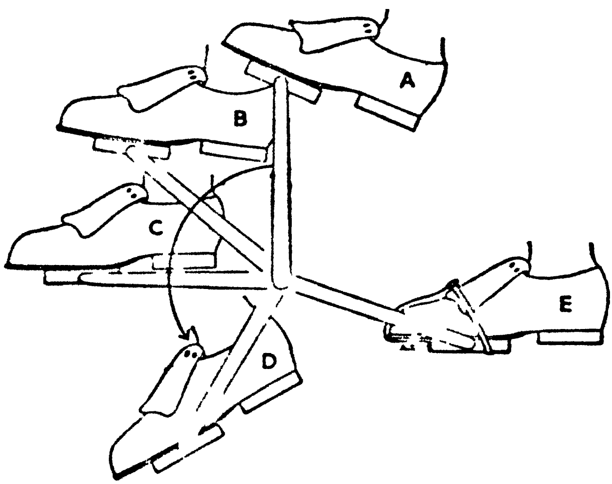


Fig. 2

like to let you into the secret of easier cycling. We now know the kind of bicycle we need. We have made it to our measure. Next, we want to find out how to ride it properly. You know the old saying: " brains *versus* brawn ". I would like to describe the brainy way of riding. It is called " ankling ". I know a rider who got himself into a British Olympic team, thanks, not to his physical strength, but to his ankles, and to the way in which he used them.

The whole theory of ankling is to keep a constant pressure on the turning pedals, rather than to exert a tremendous effort at any one point. I have made a little drawing to show how this can best be done. (Fig. 2.)

In position A, the crank is standing straight up. Theoretically,

at least, no matter what amount of pressure was applied *directly* on top of this pedal, it would never push it *down*. But if the heel is dropped a little, the minimum of effort is lost in " coaxing " the pedal *round*. In positions B and C the foot is still turning on the ankle, so that it is always levering the crank round rather than pushing it down. In position D, the foot is now clawing the pedal backwards and, in position E, I have fitted a toe-clip and strap, and the foot is able to help the pedal on its upward arc. Some riders nail a strip of leather to the sole of the shoe, so that it will fit inside the back-plate of the pedal and thus assist them in this clawing action.

This is a technique worth practising. Watch someone on the road whom you know to be a good and experienced rider. Watch his ankles. See the heel dropping at the top of the pedal's circumference. Look at his steady, almost effortless riding. Practise on your own. The best way to do this is to ride with a fixed wheel and, by taking one foot off the pedal and riding solely with the other, you will find that you are, almost automatically, ankling like a champion.

So now we have the bicycle, the position, and this ankling-action secret. Let me add a maintenance guide, a list of things to remember, say a few words about the sporting side of the game, and then wish you " Good Cycling ".

The ABC of Bicycle Maintenance.

The letter A, in our sketch, indicates the bottom bracket, the power house of the bicycle. Adjustment is made on the side opposite from the chain wheel. Release the lock-ring; tighten or slacken the cup until you have the spindle, which passes through the bracket, free from side-shake, and then fix by screwing up the lock-ring. The cranks should be able to spin about a dozen times. Heavy oil is the best lubricant.

B—pedals. Adjustment is made at the end of the spindle under the dust cap. Have them firm, rather than slack. Heavy oil.

C—hubs. The standard type is adjusted like the pedal, with a lock-ring and cone. Tighten until the weight of the valve can still swing the wheel. Heavy oil, but do not overdo the lubrication. When oil runs down the spokes it perishes the rubber of the tyres and tubes.

D—free-wheels and variable gears. Free-wheels require no ad-

justment. Thin oil. If the ratchet is slipping, try injecting paraffin to clean it. The other way of cleaning a free-wheel is to take the whole thing to pieces. This is often a night's work; at least, the reassembling can be. Adjustment of Sturmey-Archer and B.S.A. three-speed gears is made by releasing the lock-nut and the end of the control chain, and by manipulating the milled nipple which you will find there. When the control lever is in the "normal" position the indicator rod, which passes through the spindle, should be flush with the axle end. Oil as for free-wheel.

E—brakes. Adjust until brake shoes are close enough to wheel rim to allow the wheel to pass without rubbing. Our sketch shows the regular rim-brake (caliper model). Hub brakes are becoming increasingly popular. Although not so quick in action as the best of the rim brakes, they are smoother, and are not so subject to loss of efficiency in wet weather. Lubricate as per maker's instructions.

F- steering-column bearings. Adjustment made by top bearing. Should be tight, although not stiff or binding. Do not allow to be slack or to have any play. Pack with heavy grease when dismantled. Oil as frequently as you oil the other parts.

G— chain. At tightest place this should not be taut. It is dangerous, especially to fixed-wheel riders, to have it slack enough to be wobbly. The handiest way to lubricate is to trail the oil can on the inside of the chain while you keep turning the pedals.

H—the saddle. Do not let the saddle get wet. An occasional application of Mars oil, of castor oil, or of dubbin is good for the leather. You can, too, give it a shine with brown boot polish. If it is new, be prepared to have to put up with some inconvenience while you are breaking it in, or getting it to suit your own particular shape. In time, the leather may require tightening up. There is a nut for this purpose under the saddle peak.

If you attend to all these parts, lubricating where required every 250 miles, there is not much which should give you trouble.

One of the simplest cycling aids I possess is a well-used slip of paper which I have by me here as I write. It is a list which I made up years ago. It details items needed for week-ending, hostelling and camp touring. Before I pack, I gather everything I intend taking. And, so that I shall not find myself stranded in the back of beyond minus a necessary part of my gear, I use this list, ticking off the various articles as I collect them. To guide you in making your own list I give you this copy of mine: Cash, National Registration Card,

ration book, youth hostel card, hostel booking cards, rail tickets, maps, writing pad, pencil, sun-glasses and case, first-aid kit, shaving tackle, toothbrush, soap, towel, sleeping-bag, handkerchiefs, pyjamas, dish towel, swim suit, slippers, spare socks, underwear, shirt, comb, nail brush, boot brush, polish, duster, camera and spools, cape and sou'-wester, tools, paraffin stove, stove parts and prickers, matches, tent, pegs, ground-sheet, cooking utensils, salt, sugar, tea, cocoa, fat, bacon, margarine, oatmeal, jam, knife, fork and spoons.

It is surprising how so much can be made to fit into a small compass and be packed in the panniers.

Club Cycling.

Cycling can be every man's game. It can be easy-going; it can be strenuous. Most of the 12 million cyclists in this country use their machines for utility purposes, and for occasional pleasure trips. But we have also a very keen and active organization of sporting and club cyclists. The younger members go in for racing, while most of the older brigade do the organizing work.

We have two distinct types of racing, road and track, probably the more popular being road racing, or Time Trials. The Road Times Trials Council (Mr. S. Amey, "Wynfrith", Linwood Avenue, Old Coulsdon, Surrey), and the Scottish Amateur Cycling Association (Mr. S. Telford, 32 Bouverie Street, Port Glasgow) look after the interests of this fraternity. It is very much a British form of racing. On the Continent a great deal of road sport is run, with maximum publicity, on massed-start lines. Here, our racing lads shun the limelight and do not allow their activities to be fully advertised. There is a reason for this, but we need not go into it now. Sufficient is it to say that our authorities have in the past frowned on crowds obstructing the traffic when a road race was being held. To avoid possible inconvenience to other road users, time trialists prefer to have their sport, even if it means that they do not get the publicity which their athletic feats deserve.

It really is one of the few forms of sporting competition which can be said to be sport for its own sake. Whoever takes part in it must be a real enthusiast. The trial, for instance, starts at about six in the morning. The riders are sent off—all clad in inconspicuous dress—not in bunches, but spaced out at intervals of one minute between each. Pacing is not allowed. When one man catches another, he has to keep well clear of him as he passes.

In order, too, that there shall be no freak records put up on wind-assisted events, all the races are promoted on out-and-home courses. All competitors have to return to the timekeeper and have their times recorded.

Below are the leading British road records as at the end of the season 1946.

Men.

25 miles. B. B. Francis, Solihull C.C. 0 hr. 58 min. 35 sec.
30 miles. C. Cartwright, Manchester Clarion C. & A.C. 1 hr. 12 min. 51 sec.
50 miles. A. E G. Derbyshire, Calleva R.C. 2 hr. 2 min. 32 sec.
100 miles. A. C. Harding, Middlesex R.C. 4 hr. 17 min. 46 sec.
12 hours. A. Overton, Kingston R.C. 251·875 miles.
24 hours. E. B. Seeley, Calleva R.C. 444·75 miles.

Women.

25 miles. Miss E. Jordan, Addiscombe C.C. 1 hr. 6 min. 17 sec.
30 miles. Mrs. S. M. Farrell, Rickmansworth C.C. 1 hr. 20 min. 57 sec.
50 miles. Mrs. S. Rimmington, Chesterfield Spire C.C. 2 hr. 11 min. 2 sec.
100 miles. Mrs. S. Rimmington, Meersbrook C.C. 5 hr. 3 min. 20 sec.
12 hours. Miss M. Wilson, W. Croydon WH. 215·5 miles.

Probably the most difficult of all amateur cycling championship honours to win is that of "British Best All-rounder". That is the title of a competition, open to all cyclists, which lasts from April until October. The contest was, for the first time, put on an official footing in 1945 by the R.T.T.C. and the S.A.C.A. A. E. G. Derbyshire of the Calleva Road Club, won in 1946, at the record-breaking speed of 22·843 miles per hour. The average speed of each rider's best 50-miles performance, 100-miles performance, and 12-hours performance is taken. The man with the highest average wins. Derbyshire's figures were 50 miles—2 hours 2 minutes 32 seconds; 100 miles—4 hours 18 minutes 20 seconds; 12 hours—249·86 miles.

Track cycling has suffered because of the war. But the National Cyclists' Union is organizing a come-back. The Union, whose address is at 35 Doughty Street, London, W.C.1, looks after all British track sport and handles our international and Olympic affairs as well. It is really essential that any budding wheelman-

athlete should join a club which is affiliated to the N.C.U. This can be done for as low a cost as 3s. per annum, a charge which covers insurance benefits.

Apart, of course, from the rules making it necessary for a racing man to be a member of a club, there are great advantages to be gained by the beginner from the cracks; and these champions are always delighted to help. They will coach and train the young idea for the pleasure of the thing. For fellowship and comradeship on the road, there is nothing to beat membership of a good club.

The N.C.U. will gladly guide you to the local clubs; so will the Cyclists' Touring Club (3 Craven Hill, London, W.2), and the other big national cycling body, the National Clarion Cycling Club (West View, Hopwood Lane, Halifax, Yorkshire). Apply to them for details of subscriptions and of insurance benefits.

Road Manners.

Toleration, good manners, consideration for others: necessary as are these conditions in any walk of life, they are absolutely essential to users of the open road.

Although, of course, those of us who ride the single-track vehicle are not liable to do grievous injury to a third party, there is still much we can do to minimize road accidents. We can learn the Rules of the Road and the Highway Code.

Mechanically, we can make sure that our brakes are in good order, that the reflector is clean, and that the rear light is functioning. When riding in company we can be careful not to monopolize the road. Most clubs have an unwritten code of their own. Some are more precise and have a road drill in black and white. For instance: One whistle—" all on "; two whistles—" ease up "; and three whistles—" all off ". The captain, in the lead, and the sub-captains, who take up the rear, are the whistlers.

While it is best when club riding to keep two-abreast, it is not fair to form one long continuous line. It is safer, in many ways, to allow breaks in the chain. For instance, your club would be well advised to ride thus:

These gaps allow overtaking traffic, in an emergency, to " cut in ". In wet weather, too, to avoid the spray from the wheel in front, this formation helps:

The good cyclist, of course, does not stop at being mannerly. He goes farther. He is willing to assist the fellow-traveller in trouble. And, even if one does not require a helping hand, it is encouraging when a comrade of the wheel slows down and inquires: " Is there anything I can do, pal?"

FISHING

The boy who does not like fishing has yet to be born; indeed, the lure of fishing country—the silent pool in the woods, or the reedy rivulet in which the sleepy cattle stand and stare as we slowly force our punt along, or again, the broad, rippling surface of the river, freshened by the mildest of breezes, with willows hanging far out over the caving banks, and great blue dragonflies swooping like aircraft in and out among the tall reeds—is irresistible to boy and man alike. But I very much fear that the average boy has no idea how vastly real angling differs from the haphazard style of fishing in which he usually indulges. One can fish, it is true, with a six-foot cane, a piece of string, a worm on a hook, a jam-jar for tiddlers, and an undersized butterfly net, and at times one can even catch something with this outfit; but that is not angling. Your fish, remember, is a very cunning fellow, and to hunt him down requires almost as much skill and craft—especially if he be a wily carp, a sagacious trout, or a suspicious pike—as would be needed for rounding up redskins in the forest. This is the sort of angling about which I propose to jot down a few notes now; notes they must be, for the subject is so vast that we shall be able to draw attention only to those things in angling which matter most.

Leaving on one side for the present the difficult art of fly fishing—which is employed in fast-running streams to catch salmon and trout, and in quieter waters for jack or pike among others of the fly-taking finny tribe—and forgetting too for a while the special technique of sea fishing, let us begin with the young angler in lakes, ponds, and slow-moving waters, he who with float and leger seeks to lure the timid roach or the pugnacious little perch from their haunts.

First comes the vexed question of a rod. Good rods are scarce and expensive; but this should not matter very much to our young fisherman, who most certainly will benefit in skill and judgment by learning to use a single all-purposes rod for catching any kind of fish up to 3 or 4 lb. He would be well advised to procure a fairly strong cane rod, not too stiff and not too flexible, about 12 feet long, with an extra butt so that it could be lengthened to 15 feet for roach

fishing. When held in one hand, with reel attached, it should balance well, and should, of course, be quite under control. It is perhaps as well to bear in mind that the purpose of a rod is to strike the hook and to play the fish, and that fish do not exist for the purpose of displaying ornamental rods. (The older fishermen on the Thames, in fact, when after roach, use a simple, long, unjointed rod called a roach pole, which is highly efficient in good hands.) Probably your rod will have brass ferrules at each joint; if these are periodically wiped with an oily rag or a smear of vaseline they will not stick in the sockets. The rod should have fixed rings, except at the top, where a swivel type of Bickerdyke end-ring is useful. The reel should be strong and plain, with a check and line guard; and let it be as simple as possible, for in the fight with a game fish almost everything will depend upon your reel. Wooden reels tend to swell when wet and so jam the line; this can be avoided by enamelling the inside.

For general fishing, you will find nothing better than a good twisted silk line, which you can buy already dressed. Go to a dealer, take him into your confidence as to what you want the line for, and be guided by his advice; this usually pays in the end, and incidentally you may pick up a lot of hints, for dealers in angling equipment are not as other men. After using a line, always unwind it and dry it thoroughly; it should then, with care, last for years. Naturally, you will want more than one line; and the same remark applies to most of your outfit, because innumerable accidents occur when fishing, and despite all one's skill at improvising substitutes, the loss of some essential item may stop the day's sport completely.

Hooks are somewhat a matter of personal fancy. You will want some small crystal hooks, for roach fishing, and a range of round bend hooks from No. 3 or 4 size (large) down to No. 17 (small). Use the larger hooks for paste or lobworms, the small ones for wheat or barley grains, maggots, and so forth. It is wise not to have the barbs too coarse; on the other hand, the points often become blunted, but they can be sharpened if you carry a small piece of sharpening stone in your kit. Some of your hooks can have plain shanks, others with an eye at the end. They can all be neatly slipped into a small pocket-book.

Next, you will want some fine gut. Before use, gut should be soaked in water for an hour or two, in order to make it more pliable. Gut is sold in small coils of various lengths, to meet the angler's

multitudinous requirements, and frequently such coils have hooks bound on. When you wish to join two pieces of gut together, the knot shown in fig. 1 will help. For tying gut to an eyed hook, first

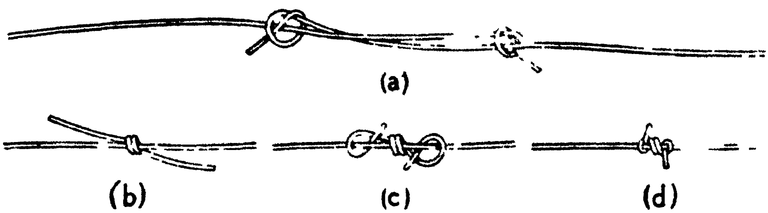


Fig. 1

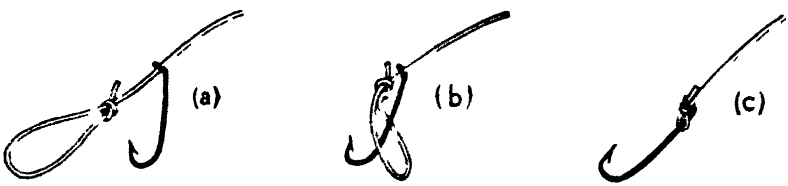


Fig. 2

tie a noose in it (fig. 2)—of course, after passing the end through the eye—then draw the noose over the hook and tighten it. Gut can be attached to hooks with plain shanks in the following manner. Lay the end of the gut along the shank, together with the end of a silk thread, then wind the thread tightly and evenly along it (just as one would whip a rope's-end), finishing off as shown in fig. 3; do this thoroughly, or you will certainly lose both hook and fish when the time comes. Test the joint by trying to pull the hook away from the gut. (Incidentally, true anglers learn after a time to test automatically most parts of their outfit that are liable to come apart, and one can do worse than to imitate them.)



Fig. 3

In order to keep your hook on or near the bottom, the line must be shotted. You should therefore have a small box—an empty pen-nib box does admirably—filled with round shot, split. In use, three or four shot are attached to the line at intervals of a few inches (the number depending on

the strength of the stream; they can be pressed on with flat-nosed pliers, or (almost as easily) with one's teeth.

We now come to the float. Floats exist in great and fearsome variety—plain quills, quills tipped with red, egg-like and cork-like floats, fixed and sliding floats. Many of these objects are quite pretty to look at; but it should be borne in mind that the purpose of the float is to tell you when the fish bites and not to tell the fish that you are after him, therefore the less that the fish sees of them—the more they appear to him like a bit of broken reed-stem drifting downstream—the less likely is he to be suspicious. A plain, inconspicuous quill (of which you should have a couple, at least) will meet most ordinary needs; but in slightly troubled water a float with a round or top-like body is useful, being steadier under



Fig 4

such conditions than the quill. (In many kinds of river fishing—e.g. in the rapid Scottish rivers, where the prey is salmon or trout, and the bait a fly—one does not employ a float at all.) Some floats are either weighted when bought, or can be weighted by taking off one end and dropping in a few shot; this type takes up a vertical position as soon as it enters the water, an obvious advantage in the still water of a pond; it also permits most of the shot to be taken off the line, thus enabling the line to sink more naturally to the bottom. Just above the float (except in sliding floats, which are used particularly in the sea) you will need a small piece of rubber, or a bristle, just sufficient to prevent the line from running through the float.

One may fish either with or without a float by using leger tackle. This comprises a small leaden weight or bullet, which slides along about one foot of fine gimp, knotted at each end. At the remote end is attached about a yard of fine gut with a single hook; the running line is attached to the near end, with, if you like, a second hook (fig. 4). In this case the bait lies on the bottom, but the nearer hook can, of course, be a few inches above it. When using a leger

without a float, take a turn of the line around your crooked finger, so that you can feel the gentle pull when a fish is nibbling; as a rule, a much sharper pull a few moments later shows that the bait has been seized. Slip the loose line off your finger *instantly* and bring your rod into play.

Many fine perch, a very game little fish, can be caught by ordinary float-fishing methods; but perch much favour weedy ground, where it is often more convenient to use a special arrangement, known as a paternoster (fig. 5). It comprises a length of gut—three yards will do excellently—in which two loops have been made, one not more than three or four inches from one end. At this end attach a light pear-shaped lead. Allow 18 in. between the loops. The running line is fastened to the upper end. To each loop is attached a medium sized hook—Nos. 7 or 8—on not more than five inches of gut; thus the hooks will hang out almost at right angles to the line, and at different depths, an important matter when dealing with perch. If desired, a third loop and hook can be added, which, of course, enables one to search the weeds more thoroughly; but in general (and especially when fishing among reeds or rocks) the less complicated one's outfit the less likely are things to go wrong. For bottom-living fishes, of course, a paternoster is not of much use.

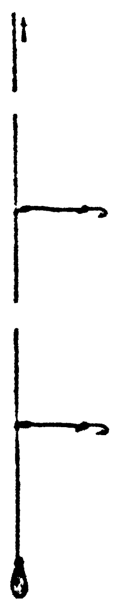


Fig. 5

Completing this long story of the line, you must have a lead plummet for sounding the depth. One shaped like the stub of a candle, with a ring at one end for the line, and a hollow scraped out of the other, should suffice; within the hollow a little tallow is placed, so that by its impression when it touches bottom a small sample of the mud or sand can be brought up; this is important, because many fishes grub for food among muddy bottoms, whereas others prefer clean gravelly or sandy bottoms. If, when sounding, one throws the plummet in with a splash, it will probably scare away all the fish in the vicinity; just drop it in silently. When you have got your float in the right place, it should be remembered that you will need to lower it an inch or two, otherwise the hook will rest on the bottom. Don't forget to alter the position of your float if you move to a spot where the depth is different.

A landing net is useful though not essential. You may never catch a big fish, but if you do you will certainly need a net in order to get him ashore. The net should have a plain ring, about 12 in. in diameter; there are some advantages of storage in a ring which folds on itself into two semicircles, but the strength is affected at a vital point. By the way, when your fish is exhausted and you have reeled him into the boat or the river's bank, see that you have a flat stone inside your landing net; otherwise you may find the meshes folding themselves round the frame just when you most need them to be folded round your victim. Two other items to be remembered are a wire disgorger (fig. 6), for removing hooks from a fish's throat, and a sharp penknife. That you will take tins to hold live bait and other messy items, a cloth for wiping your hands, and a basket or stiff-sided haversack into which everything can be neatly packed, goes without saying.



Fig 6

Assuming that all these preliminaries are over, and that you have procured from the manure heap in some local farmyard a supply of juicy lobworms, or smaller worms from the garden by an early morning search; that you also have a bag of stale bread, some boiled wheat grains or barley, a few fragments of cheese, and some ground bait, we next have to decide where to do our fishing. This brings us to the vexed question of trespassing. There are carp ponds and private fishing reserves on rivers all over the country, and the privacy of these should be strictly respected; apart from any other reason, owners of property and fishing rights spend considerable sums of money in stocking their waters, and members of fishing clubs pay subscriptions or fees for the privilege of fishing there; so that if you intrude you are getting for nothing what everyone else has to pay for, which is unjust. There are abundant places where fish lurk, however, and where you can fish without fee, e.g. wherever there is a towing path along a waterway, as on the Thames or the many canals. If you know of a spot locally, to which you would like to go but which is private, write and ask for permission; owners are human, after all, and you may get the permission to fish the stream simply for the asking. If you are in earnest about your fishing, and you find the lure of the sport drawing you on, you should join an angling club, of

which there are scores scattered all over the country. But do not trespass.

In public waters, the haphazard method of taking up one's post at any odd place on the bank will not do at all, for one may leave a line out there all day and deservedly catch nothing. Fish have set habits and particular haunts, and there they must be sought out. We will indicate the more likely places, species by species, later in these notes. The fish, whether they be timid roach, greedy perch, the ground-loving bream, grayling, the cheeky chub or the excessively wary carp, all have individual preferences in food, though I do not think these are as great as some anglers would have one believe; but the fish must be tempted, and their appetite whetted by a preliminary taste of the real bait, if they are to bite freely. For this purpose, the spot selected is ground-baited. Ground-baiting must be carefully done, or it may prove worse than useless. It can be done in two ways. The first is to ground-bait the spot overnight. Make up some balls, not too large, of bran mixed with crumbled bread fragments and a little black treacle; drop these in the river or pond, taking care not to overdo it, and memorizing the exact spot. Next day, at about the same hour try your luck there. If you are fishing with worms, a worm or two should have been among the ground-bait, if with barley, a little barley, and so on; the idea being that the fish should see in the hooked bait just what he has already been feeding upon. (Of course, if you have thrown in too much ground-bait the fish will not be hungry and will not bite at all.) The second method is to make up smaller balls and much more loosely; then throw them in above the selected point, so that they will drift to the bottom in the right distance. Throw in only a very little, repeating the dose from time to time throughout your stay. It now remains only to bait your hook and to bag the expected fish. Of course, we do not know what the fish thinks about it, but all experienced anglers are agreed that it matters little whether the point of the hook shows through the bait or not. A fish that is nibbling is caught by the point of the barb when you first pull up the rod, whether the bait is round the barb or farther up. The essential point to remember is that the bait should look natural. Maggots should be pricked through the skin. Worms can be threaded completely on the hook, or a piece of worm suspended from it (a bad method), or two hooks used (a good method). Large lobworms may be hooked on Stewart tackle

very successfully; this comprises two or more hooks, one above another, bound to the gut (fig. 7); one end holds the head and the other the tail of the worm. Paste bait can conveniently enclose the whole hook.

One last word on preliminaries. It is *not* desirable to run along the bank, shouting "Here's a place!" or to throw stones into the water, or even to row a boat with unnecessary splashing and noise over the place where you intend to fish. If you are on the bank, keep well back out of sight; if in a boat, simply drift down to where you have decided to stop, and then lower your anchor or punt-pole quietly. River fishes have many enemies and instinctively dart away when shadows cross their line of vision; that is why it is so difficult to catch them in clear water on sunny days. They are also very sensitive to sounds; even heavy footfalls on the bank alarm them. Silence and cunning, therefore, must be your motto if you desire success. Finally, although many a good fish has received his quietus during the day, the best hours for fishing are almost always early morning or in the evening twilight; when the mists are just beginning to rise from the water, or when in the gloom of sunset they are creeping back.



Fig. 7

We come next to the fishes one is most likely to catch.

Roach are very abundant, not only in the Thames, but in most rivers. They are small, silvery fish, rarely exceeding a pound in weight, bluish green on the back, and readily identified by the red fins and tail and the red ring round the eye. Another fish of somewhat similar habits, the rudd, may be confused with roach at first, but the upper lip of a roach overhangs the lower lip, whereas the reverse is the case in rudd. Roach require the finest of lines, baited with gentles (maggots), bits of paste, barley grains, or wheat on small crystal hooks; the angler should be as far away from the fish as possible. Roach frequent the clear running water in channels, between reed beds, and commonly only five or six feet deep. They also occur under overhanging banks, but in that case the angler should keep well away. Those who fish for roach with a single long pole tie the end of the line to the head of the pole. Fishers in the Nottingham or Sheffield styles use a free line, which will run out to a considerable distance when cast with skill; but this requires a lot of practice and is best tried repeatedly on some convenient piece of water with an unbaited line, before you attempt it in earnest.

Roach may also be fished with a leger tackle, using paste bait. The most important thing to remember is that the fish nibbles so delicately as scarcely to move one's float; hence it is necessary never to let one's attention wander, but always to watch the float. When you see it move, strike instantly—i.e. raise the rod smartly until you feel the resistance of the fish. It may be that you have not noticed what occurred to the float until it bobbed under, and that you have a much larger capture, possibly a fighting perch or a bream. If the resistance is very strong, play the fish. Keep steady pressure on it, endeavouring to get it up near the surface and away from its fellows, or you may scare a whole shoal away. When the resistance slackens, reel in a little; if it again increases, give the fish his head, but still keep strong, steady pressure on him; gradually you will wear him down, until the moment when he comes within reach of your net. The poor little roach, however, does not make such a struggle as this; the problem in his case is to get him properly hooked. If, while your capture is still out of sight, you find the line unyielding and yet not pulling away from you, you have certainly caught it upon some obstruction on the bottom. It may be that the best thing to do then is to release a couple of yards of slack. If the fish was the obstacle, he may come out of his hole on finding the resistance weaken, and so give you another chance; but if you are fast on a snag you will have to get your rod above it so that you can pull in the reverse direction, and even then you will probably lose hook and gut, if nothing more. Such accidents, however, add zest to the sport.

The general run of *Bream* are much larger than roach, although one may be unlucky enough to catch nothing but small fellows. As a rule, if small fish are not too badly injured, it is best to throw them back, unless, of course, you want them for baiting a pike rod. The bream is a deep-bellied, thick fish, with large dorsal fin and a rich bronzy hue. Specimens of 4 or 5 lb. are quite common, and double that size is not very abnormal. They have a rather muddy taste, but are not bad eating if of fair size and fried by a Norfolk housewife. They live on the bottom in shoals, usually in deep water —10 feet or more—and in pools, where the water is still and the mud undisturbed. They do not often bite during the early part of the day, except before breakfast; but if you fish for them in the late afternoon and evening, you should be rewarded. The best bait unquestionably, in my opinion, is a lobworm, with which

delicacy my father and I often caught a pailful as fast we could haul them out. (It is true that the day before we had made a good supply of bran mash and had liberally ground-baited the spot that night.) Bream, after playing with the bait in an unmistakable manner for a moment or two, pull the float under sideways, so that it comes to lie flat on the water; that is the moment to strike. A big fish will struggle and splash a good deal; but by keeping your head *and* your rod, and above all, maintaining even pressure on the fish (the golden rule for most fishes), you should bring him safely ashore. This fish abounds in the Norfolk Broads and on the Great Ouse; he is most conveniently sought from a boat, as a rule. To put the captive out of its misery, give it a sharp blow on the head with anything handy – another rule of general application; otherwise you will have bream slime and scales all over everything. As this fish is a bottom-feeder, the bait should, of course, rest upon the bottom, or as near it as possible; hence, leger fishing for bream is a regular pastime.

Mention of this fish recalls its unwelcome neighbours in Norfolk meres and other deep holes, the eels. *Eels* are the bane of most anglers' existence. Rarely large enough to be eaten, they seem to bite at anything that touches bottom, then coil themselves round hook, gut and line, and then refuse to die when at last you have the tangled mass ashore. On the other hand, large eels (if one can catch enough of them) make a delicious meal. To grip a wriggling eel, throw a cloth round it and hold tight. The only successful way to stop an eel's struggles, and to extract the hook, is the old-fashioned one of cutting off his head, hook and all; the eel's deep swallowing of the bait arises from a beautiful natural arrangement of the fish's teeth, which are so designed that the more a living prey struggles the worse it is engulfed. If you are deliberately looking for eels, search the bottom of deep, muddy streams and holes, and still water generally.

The *Perch* is one of the most handsome little fishes you are likely to meet with, besides being game to the last. It is a small, thickly built fish, but does not weigh more than ½ lb. to 1 lb. as a rule. It can be distinguished instantly by its golden colour, the vertical stripes on its sides, and the large front dorsal fin. When alarmed, the dorsal fin is extended, the spines being very sharp; such a fish should be handled cautiously, as the spines can give one quite a nasty wound. (Sea fishers should note that similar remarks apply to

the equally greedy and pugnacious little weevers; for the spines of their fins are tubes that end internally in a poison gland.) River perch like running water, but are most commonly to be found near reed beds, or even among the reeds. According to the circumstances, then, one uses ordinary float tackle or a paternoster. Bait your hook with lobworms, redworms, but especially minnows or fresh-water shrimps. Perch will also snap quite readily at an artificial or "spoon" bait; see below.

Chub are timid and suspicious fishes, although one may often see them snapping at flies and grubs in the water. They are particularly fond of foregathering beneath some shady willow whose leaf-ends rest in the water, for there they find their food; but in such places they are difficult to get at, nor must the angler allow himself to be seen, or the chub will dive down among the roots at the bottom and stay there. A good method of fishing chub is to throw out a long Nottingham line well above the desired spot and let it drift down upon the fish as naturally as possible; it is necessary to check it from time to time, because the float tends to overrun the hook, and chub are suspicious of floats. Try baiting with a bit of cheese in paste, or even cheese alone on the hook; or with a small worm. Of course, chub will also take flies well; but fly-casting is an art in itself, to which we will devote a few notes later in this article.

Dace look much like chub, but are smaller, rarely exceeding a few ounces in weight, and their fins are silvery, not tinged with red. They are widespread fishes, occurring in deep water, on gravelly bottoms, or below weirs, and are equally at home near the surface or the bottom. They will take maggots, small worms, or flies indifferently. They also fall to small artificial flies, an object which can conveniently be attached to eyed hooks.

Finally, we must mention the *Carp*, most cunning of fishes. We may observe him in many a pond, deliberately breaking the surface as he snaps at the insects hovering overhead, a big fat fellow, perhaps 10 lb. or more in weight; we stir, and in an instant he has gone, being hopelessly lost among the rushes or weeds. To catch a carp requires much luck, besides very special pains. The fishing is best done very early in the morning. The gut should be stained pale green, so as to make it like a thread of weed, that part nearest the hook being a dirty brown. The float should be adjusted so that the hook end of the gut rests on the bottom. Bait the selected spot beforehand with plenty of bran, bread and worms. When fishing,

drop the line in as quietly and as far away from you as possible, then rest your rod against your folding stool, holding down its end with a hook-shaped iron stake that you have provided, and stand well back, awaiting events. The object in not holding the rod is lest, by the slight tremor communicated to the line, the wary fish should detect its existence. The float moves, but wait! It goes under water—now is the time to strike! With a little luck, you will have caught your first carp.

Sooner or later in your fishing adventures you will encounter a *Pike*, or more likely its young brother, which in southern waters is called a jack. Its long, lean, ugly body, protruding snout and deadly sharp teeth make the pike unmistakable. It preys upon smaller

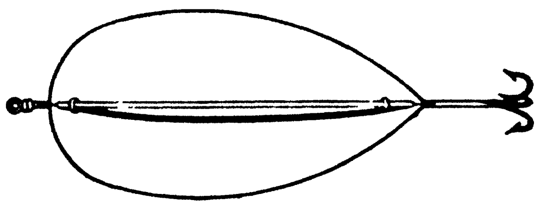


Fig. 8

fish such as the roach, or even upon other pike, but is of a sullen and incalculable humour, sometimes lying for days together in the stream, scarcely moving, at others rising like lightning to seize in those formidable jaws something which appeals to its taste. A river runs at the bottom of my garden, and I once watched a jack there, about a foot long, which scarcely travelled a dozen yards in as many days; nor could he be tempted by a bait, although I could easily have netted him had I wished. More commonly, however, pike keep out of sight, in reeds and under weeds, ready to dart out at the shoals of smaller fish in the moving water close by; drainage ditches in the Fens, and backwaters of the Norfolk Broads, are natural hiding grounds of pike. These fish can be caught with a "spoon" (fig. 8) which is drawn along at the proper depth behind a boat; it comprises a hollow oval piece of metal, somewhat like a spoon, which spins on a bar that is attached to a strong triple hook; being brightly coloured, the motion of this mechanism attracts or irritates the pike, which will rush at it and endeavour to snap it up whole—usually with disastrous results to himself. Pike are also

caught by spinning live bait, such as minnows, behind the boat. Spinning is a special art, to which we could devote a whole chapter had we the space. Pike require a heavier rod than your general-purposes rod, and likewise heavier tackle.

The fishes we have mentioned so far are all known as "coarse fish", although several of them make excellent eating. For game fish, the handsome, silvery salmon, and the numerous varieties of trout, we must employ other methods. They afford the highest test of skill in angling and are nearly always fished in private waters, which are frequently stocked and rented for the sake of the fishing alone. The principal bait for these fish is the artificial fly, which exists in a wonderful variety of patterns and colours; more or less like an insect in the case of trout flies, it is a gaudy and showy mass of feathers in most salmon flies.

If you intend to do fly fishing, it is desirable to have a trout rod and the other equipment specially suited to that branch of the art. Good trout rods can be had either in greenheart or in tubular steel; the rod should be 10 to 10½ feet long and should have a good deal of natural "whip" in it. Of course, it should be furnished with a good, easy-running reel, preferably with optional check and line guard. The fly line comprises about thirty yards of dressed silk, doubly tapered, i.e. tapering from the middle towards both ends; the object of this is that if you break it you can still turn it round and use the other tapered end. It is joined on to a similar length of waxed backing line. For your cast, use only fine gut, say 3x or 4x, or horsehair. You will find a pocket-book essential, with plenty of partitions to take flies, droppers, spare coils of gut, hooks, &c. Another necessary item is an amadou pad, used for drying wet flies.

Most trout fishing is done from preserved waters; but plenty of free moorland and lake fishing is also to be had. Moorland trout are small but game, generally being much less bulky than the fat, lazy fellows which hang about in southern chalk streams; but the real monsters are the lake trout and some which come into estuaries from the sea. Despite their very different appearance, all kinds of trout are believed to be merely varieties of one species, of which the common brown trout is the typical representative.

Good fishing can be had from the bank of many a charming stream. In lakes, on the other hand, a boat is usually essential; but it should be manned by an oarsman who is himself a fisherman, otherwise you will probably frighten away or lose more fish than you

take. The greatest pleasure of all trout fishing, however, is to work upstream or down, and from side to side, in the water, wading far out, with the clustering tree-clad hills around one and the river sweeping merrily past one's knees. Such work of course demands a good pair of waders and brogues; and as the bottom is often gravelly and slippery, rope-soled footwear will be found a decided advantage.

As with all other fish, if we want to find trout we must first consider where they obtain their food and what they eat. Trout are cannibals. They will greedily snap up small fishes of any kind, hence they are to be looked for in the deeper water close to where shoals of such fishes disport themselves. They also cast a hungry eye upon Mayflies or any other water-loving insect which drifts exhausted down upon the surface; they like the larvæ of insects, too, worms, and are quite fond of snapping at a spoon bait; but they are highly capricious and at times will not be tempted even by the choicest fare. They love pure, fast streams, usually lurking in the greener pools just beyond the edge of a shoal, i.e. where the eddying water carries more food than normally past their noses. Similarly, lake trout should be looked for opposite the bar or shoal at the entrance of an incoming stream. In chalk rivers they haunt the deeper pools, but are ever ready to dart out at prey which is passing, or to rise to the surface and snap up a fly. As the fish usually lie with their heads upstream, they can be approached with some confidence from below; but once let the trout suspect that your line is there and your efforts will probably be wasted.

The most approved method of catching trout is with a fly; and this means of course that the early summer is the heyday of the trout fisher, for then the greedy fish will take almost anything. There is a vast variety of trout flies, some experts preferring one type and some another; but the truth probably is, that provided the bait bears some resemblance to a real fly—which sometimes is actually the case!—the fish is not particular. There are two alternatives, dry-fly fishing and wet-fly fishing. Dry flies are intended to sail serenely upon the surface, just as if they were exhausted and had been blown there by the wind. Wet flies, on the other hand, are better suited to turbulent streams, where to the trout's mind it would be a natural thing for a trapped insect to be carried below the surface.

When fishing quiet streams, it is customary to attach one fly to the end of the line and a second to a " dropper " about 18 inches

higher up. (The dropper is a short piece of fine gut, which is attached at right angles to the cast.) In rougher waters, three flies may advantageously be used on one line, and in some streams four are usual; keep them 18 inches to 2 feet apart. The fly is either whipped on to the shank of the hook, or (an easier job) is fastened to an eyed hook; it does not matter very much, in the view of most fishermen, whether the point of the hook shows or not.

The difficult art of casting - a perennial subject of discussion among anglers—is best practised beforehand in a meadow or over a pool (preferably where there are no high reeds); and you should practise casting on both calm and windy days, so as to observe the otherwise incomprehensible things which the wind will do to your line. By patience and persistence you will acquire the knack of throwing out a considerable length of line against a wind, and also how best to overcome the dragging action of the wind; I repeat, it is a *knack*, which no words can teach you. Decide to drop your fly on a certain marked small circle, and try repeatedly– anyhow you like; never mind what the books say– until you manage it. For overhead casting, the action is not unlike that of the driver of a four-in-hand cracking his whip above the ears of the leaders. Throw out the line behind you, raise the rod until it is vertical, and let the line come right over, as near as may be to your shoulder; the nearer it is to you as it passes ahead, the less is the wind resistance and the more accurate will be your cast. Keep your head still and your eyes focused on the spot at which you intend to strike. But since you do not want your line to come down on the water with a thwack that will startle all the fish away within a hundred yards, the descent must be checked at the right moment; this is done with a flick of the wrist and by aiming just above the water rather than at it; but do not transmit too much flick, or you will make the end of the line jerk, and you may jerk the fly off it altogether. In a good cast, the fly just seems to drop on to the water like an exhausted insect, almost above the nose of the expectant fish.

The line is greased for dry-fly fishing, to keep it afloat, suet being popular for this purpose; similarly, the hackles of the fly are treated with medicinal paraffin. If a fly gets wet, dry it on your amadou pad.

As a rule, it is not much use trying to tempt trout with artificial flies when there are no natural ones brooding above the water. The fisherman, however, if observant, may catch a glimpse of the fish,

particularly of its flashing side as it moves through the water; and he may then tempt it with other bait, such as a wet-fly. For wet-fly fishing the tail fly is not greased, nor is the end of the cast; but it is usual to have a greased dropper with a dry fly at about a yard up the line, which are afloat and give the angler two chances. Wet-fly fishing demands a sensitive touch, almost an instinct for feeling the slight pull on the line as the bait is taken, since the bait cannot be seen. If you get a bite, or if you suspect one, strike instantly. If a fish is on your line, keep the point of your rod well up, but play the fish, i.e. keep a steady strain upon him until he tires, for he will certainly dart away at breakneck speed; but after each rush draw him a little nearer to the fatal net. When the critical moment approaches, see that your net is ready in hand, or you may lose your prize after all.

Natural fish, such as minnows, may be a deadly bait; so may a bright metal spoon, drawn along just below the surface. Trout often snuffle along on the bottom grubbing for larvæ, and while there they may be tempted to snap up a worm with a hook in it, or an immature insect.

Sea fishing by amateurs is another art to which a volume could be devoted; for here, even more than with river fishes, it is desirable to know the habits of the fish, the levels at which they live, and what kind of bait most attracts them. It is also vastly interesting, for the sea angler may hook species the very names of which are unknown to him. It is probably true, however, that sea fish are less particular, and are much more easily caught, than river fishes; for one thing, when in shoals their numbers may be enormous, so that their urge to seize any sort of food must be overwhelming. Good sport can be had with an ordinary hand line wound on a frame; but a small rod with a large reel does very well. The tackle, size of hooks, bait, and other necessary details, depend upon what you hope to catch; and since the best fishing is done from a boat half a mile or more from the land, you will be wise if you talk to the fisherman whose boat you have hired, and do as he tells you. Bass, mackerel, whiting, codling, grey mullet, eels, sea bream, dabs, pollack, are a few of the many fishes which abound around our shores; and the sea is free, and you can fish everywhere. Good places to try from the land are where rocks overhang comparatively deep water, or off headlands, or at the mouths of narrow estuaries like the Teign or the Exe. Fishermen

with rod and line, working in the breakers on an open shore as the tide comes in, frequently catch fine bass; and despite the poor appearance of many baskets on the typical seaside pierhead, quite large fish come in with the tide and are caught there from time to time. Cod and halibut haunt the bottom near shoals, and cod at least can always be caught there with a tempting small crab or a mussel. The sea fisherman's standard baits, in fact, are mussels, crabs, and lugworms. You may notice the latter by the little knots of sand which they throw up on the shore or in the harbour; the worm itself may be caught by quickly thrusting a sharp spade deep in the mud and turning it up. Bass fall very readily to a live shrimp, whiting to pieces of fresh herring or squid, mackerel to any small live bait. Mackerel and pilchards, by the way, like many other marine fishes, live in the upper part of the sea, and at night roam on the very surface; but during the bright daylight they sink a few feet, so that anything which you trail in search of them must be at the proper depth. You can always spot when fish are about by watching the gulls. If you find that a dozen gulls or so have started what looks like a committee meeting in one little spot of otherwise empty blue sea, you may be sure that fish are there.

Be careful how you handle marine fishes before they are dead. Many of them are capable of inflicting serious injury in the confined space within a boat, if not promptly knocked on the head. This particularly applies to the conger eel, which abounds in the English Channel, and which has caused its captors many an anxious moment before it received its quietus.

GOLF

In my lifetime, most of the best writers and many of the best players have written books about golf and how to play this very difficult but most agreeable game. Whilst I always welcome criticism of my views and theories, I hope that those who detect the many omissions in this article will remember that it is but one short chapter, and that the space allotted precludes my dealing at greater length with the many details of playing technique.

Golf differs from other games in many ways. Apart from the games which are played upon a billiard table and a croquet lawn, it is the only game played with a stationary ball; and yet, I believe there is none more difficult, none more agonizing to the mind, and none that requires more self-discipline and patience.

The marked improvement in golf clubs and golf balls is partly responsible for the great advance in the general standard of play during recent years. Men like Braid and Taylor, Jones and Cotton, who have given the best part of their lives to the study of the game of golf, have not only popularized it enormously, but their doctrines and methods, aided by the camera and the cinematograph, remain for the benefit of those who come after. In our country Cotton himself is largely responsible for the vogue of *practising* both amongst amateurs and professionals; and it is idle to pretend that serious practice is not beneficial to everyone, whatever his standard.

To my mind, golf has two very distinct sides. There is the mental side and the physical side, and both are of the utmost importance; for both mind and body must be drilled to act automatically and in complete harmony. Let us examine first the importance of drill for the mind.

In his admirable book, *Golf, My Life's Work*, J. H. Taylor says: "To try to play golf really well is far from being a joke, and light-heartedness of endeavour is a sure sign of eventual failure." In that sentence I believe "J. H."—to use his more famous soubriquet—strikes a note which rebounds in the conscience of every golfer. We all want to play well, and however well we play we all want to play better. At his best Henry Cotton believed that he could always

have played better. That very fact places each one of us in—as it were—the same struggling atmosphere, whatever our ability, whatever our physical attributes, and with whatever temperament nature has endowed us. I believe that since the game of golf is an entirely individualistic one, its very loneliness during the strain of battle demands greater powers of concentration and greater powers of self-control than any other game. Herein lies much of its fascination. There is but one golfer of our time of whom I have never seen it recorded that he was feeling the strain or that he was unfit. This man is an American, the mighty Hagen. Of others, "J. H." admits that he often felt sick during a championship, but he throve on this horrible feeling. Henry Cotton often looks a ghastly colour in the arena where his name might appropriately be Stalin (man of steel). Bobby Jones, an incomparable champion, gave up competitive golf that he might better enjoy his life. At the very other end of the ladder, I remember playing in a club foursome competition with a banker friend of mine whose handicap was 19. On the morning of the 36-hole final, I saw him emerge from the cloakroom looking both pale and drawn. He apologized for his ashen appearance and explained that he was always sick before every round of a competition! I believe it to be a matter of great importance that all young players should be fully aware that golf demands a very great mental effort, and let no young player imagine that his opponent is less highly strung for the occasion than himself. We all feel the strain. Oddly enough, match and medal play seem to require an altogether different outlook. In these days of large fields comprising more than 200 competitors, most of whom can hit the ball a long way with a modicum of accuracy, the 18-hole match has ceased to be a real test of ability. In a short sprint match over 18 holes, luck plays far too big a part in the result of the match. A stymie here, a bad kick there, and a long putt or two can put out the greatest player. Bobbie Jones himself never overcame his dislike, and indeed his fear, of this form of golf. When at the zenith of his powers, he came from America many times to compete in the British Amateur Championship and yet he was but once successful. Difficult as it is to put into practice, there is only one way to acquire complete peace of mind for a championship match. One must be philosophical and say: "I am going to play par, I am going to ignore my opponent's ball, and if my opponent can beat my par, here's luck to him."

Medal play, on the other hand, even over 18 holes, almost in-

variably produces the right winner and at any rate the man who plays best on the day generally wins the tournament. Many young players have to wait patiently before winning their first medal competition because, through lack of experience, they have had one disastrous hole. If on quiet reflection that disaster is reconsidered, it will nearly always be found that after all it was quite unnecessary. Let us take it for granted that however well we play we are bound to make a slip or two. The correct attitude of mind should be, "Whatever happens I am going to keep the ball in play, and when I make a mistake it is going to cost me the minimum number of strokes." In other words, having, shall we say, driven into the rough, make up your mind that, unless the ball is lying really well, you are going to hit it back on to the course with the easiest and safest club. That is the only way in which sevens, eights and nines can be avoided.

We have neither time nor space here to go thoroughly into the question of the rules of golf, but nevertheless they are of the utmost importance. My advice is, get to know them and, moreover, carry a copy in your pocket when playing an important game. Lest this piece of advice be taken lightheartedly it might be well to record that had Mr. Cyril Tolley, one of the greatest amateur golfers of all time, known the rule concerning a ball touching clothes he would in all probability have won the British Amateur Championship for the third time at Hoylake in 1933.

Having very briefly touched upon the mental side of golf, we now come to the physical side or drill for the body. Since no two of us are made alike, it is obviously impossible for all of us to play in exactly the same way; but although this may be so, there are certain basic principles which to-day are almost universally employed by the great players of our time. There are, however, two divergent schools of thought upon the question of which hand strikes the ball. (I assume for the moment we are all right-handed.) Having, at one time, been of the company of those who imagine that the blow can be delivered with the back of the left hand, I am now a convert to the school which believes that the right hand delivers the blow and that, if you want to play with the left hand, then you must turn round and play left-handed. The remainder of this chapter is based almost entirely upon this assumption.

To watch a good golfer—man or woman—hit a ball from a distance is to my mind to watch an agreeable and at once a beauti-

fully natural performance; yet I know of no game in which, in order to strike the ball correctly, it is necessary to go through a more complicated and unnatural series of movements. The term "a natural golfer" is erroneously used; in my view, no such people exist to-day, and if they do I am sure that they are not first-class players. On the other hand, there are undoubtedly people who can make the complicated golf swing appear to be a perfectly natural performance.

Let us now get down to the mechanics of the golf swing. What you must remember is that there are many ways of swinging a golf club successfully, and I propose to describe the way which appears to me to produce the most consistent results. All sorts of methods are successful over short periods, but the best player to-day is the one whose off days are fewest and whose off days are not disastrous.

The Grips.

The first question we must study is the all-important grip of the club. The golf club is really rather a difficult implement to grip comfortably and yet properly, and as much patience is required to get accustomed to an orthodox grip as is needed to teach oneself to keep the head down. Before defining what I believe to be the orthodox grips of the modern golfer, I would like once again to emphasize the difficulty of gripping the club comfortably and correctly. It may be beneficial if I here recall my own experience. When starting to play at the age of twenty I thought I was copying some expert's particular grip, but I was not. I got accustomed to this grip; but later on, when I tried to break myself of it and assume an orthodox grip, I found it extremely difficult to get comfortable. Moreover, it was diabolically difficult to hit a ball with the new grip. The way I got over this difficulty was to carry about a walking-stick, similar in size to the grip of a golf club, and constantly to handle it in the correct fashion. After several days I found that the new grip had become the natural one and I was able then to start hitting a ball. Therefore, make up your mind to get accustomed to a good sound grip before attempting to hit a golf ball, and above all, stick to it.

We may say that there are to-day three good standard grips, and whilst each one is fundamentally the same in regard to the position and angle of the hands on the club, they differ in so far as each one gives a totally different feel to the striker.

The three grips are the overlapping or Vardon grip, the interlocking grip, and the two-handed grip. Taking these grips in turn: (1) In the overlapping grip, it will be seen that the little finger of the right hand lies in the groove between the first and second fingers of the left hand. (2) In the interlocking grip, the







Overlap grip

little finger of the right hand and the first finger of the left hand are interlocked. (3) In the two-handed grip, the hands are not joined together, and each rests naturally on the shaft independent of the other. I believe the overlapping grip to be the most popular to-day, for it gives the hands the best chance of working together. People with long fingers often find the interlocking grip most comfortable. Personally, I do not like it, since to me it always creates a tendency to put the left hand too far on top of the shaft. The two-handed

grip is the easiest to get accustomed to, but with this grip there is always a risk that the hands will not work smoothly together. Perhaps what commends it most is that it is used both by Cyril Tolley and Abe Mitchell. Cast your eye again at the illustrations and you will notice that they are fundamentally the same: in the first two the Vs made by the forefinger and thumb of each hand point straight down the shaft, and in the third, though there is no V showing, the left hand is relatively in the same position as in the



Interlock grip



Two-handed grip

others. I repeat, the risk in the employment of this grip lies in the fact that the left hand may tend to creep too far on top of the club, and is likely to cause a hook. Grip the club in the fingers rather than in the palms of the hands, whatever your grip.

Stance.

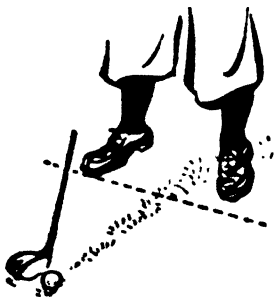
Whilst a good striker of a golf ball can hit the ball accurately from any stance, no hard-and-fast rule can be laid down as to the best stance to adopt. There are but three alternatives; closed, square, and open.

Fred Robson, the Addington professional, has a veritable genius for making his pupils stand in a comfortable position and one which suits the particular individual. I should say he prefers the open to the closed stance, and that he does not mind the square stance.

From my own experience I heartily recommend the principle of adopting the most comfortable position. Having found what suits

you best, never alter it because you have seen some great player standing very differently. What suits him may not suit you!

One word of warning. If you find the closed stance agreeable, bear in mind that with this stance one is very apt to stand more and



Open



Closed



Square

Stance

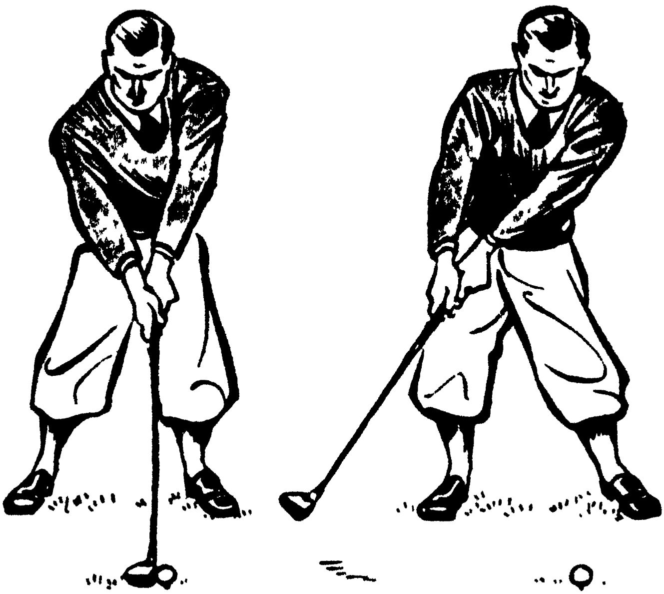
more closed, with the ball lying more and more off the back foot. This will cause topping and all manner of trouble.

Lastly, for a normal shot, whatever your stance the ball should lie approximately opposite the left heel.

Arm Action.

The difference between the old and the modern golfer is in my judgment due to the fact that it has been found possible to make great use of a straight left arm, acting as a governor, and at the end of it a left wrist, acting as a hinge. All golfers want to make their swing mechanical. This achievement is utterly impossible for the human being, but, if a basis can be found upon which it is possible to take the club back in the same groove, in the same arc, and to

the same point, for every shot to the green, then it is more likely that the blow at the ball can be struck from the same point in the swing, through the same arc and in the same direction. This may sound rather complicated; but obviously, if you do not take the club back along the same path each time there can be no hope of bringing it down on the same path. Try it out and see for yourself. Furthermore, a straight left arm in the back swing gives more or less the same width of swing and consequently the same power.



Address for drive — Commencing back swing

Straight left arm

How can we learn to get this left arm straight? I am convinced that the easiest way is to practise the movement with a golf club in front of a mirror. At first, it will probably be necessary to roll up your sleeve so as to make quite certain that the elbow is not bending. It is most likely, too, that in order to achieve success in your early attempts it will be necessary to stiffen the muscles of the left arm. Once you have acquired the knack you will be able to relax the muscles of your left arm and swing easily without any apparent tension. Having drilled your muscles well enough to keep the left

arm straight throughout the back swing, we must now examine the remaining functions of the left arm. At the top of the swing the right hand begins to come into action to deliver the blow, and the left arm, as a governor, is required to ensure that the blow is struck in the right direction. No real difficulty will be found in keeping the left arm straight until the point of impact with the ball, but since we are trying to arrange that the club head shall travel for as long as possible in the intended direction, it is of the utmost importance that the left elbow should not " break " until the club head has travelled at least two feet past the ball. Note that on impact with the ball both elbows are close together and remain together, thus forcing the club head to travel square in the direction of the target.

Keeping the elbows together after striking the ball is one of the most difficult physical operations in the golf swing and can only be acquired with patience and practice in front of a mirror. I would say that it is utterly impossible to achieve, if in the early stages one is endeavouring to hit a ball at the same time.

There was a time when almost all who aspired to teach golf were inclined to say: " Get the wrists down when addressing the ball." This very bad advice was in some ways quite natural, since if the wrists are down or " cocked " before the swing begins it is more than likely that they will be cocked at the top of the swing. Nevertheless, if the wrists are cocked or partially cocked when addressing the ball the whole back swing tends to become too rigid and the left hand loses its suppleness.

Bobbie Jones once said: " You can tell a golfer's ability from the first ten inches of his swing," and before leaving the back swing we must deal with this most important section, as well as the position of the hands at the top of the swing. It is a matter of the utmost importance that the club head should begin its journey back dead square to the ball; that is, it must continue to " look at " the ball for as long as possible. There must be no outward turning of the club head. The way to acquire a sound initial movement of the club head is to make the hands move first, in the direction in which the club head is about to travel. If the wrists are cocked when the ball is being addressed, as already mentioned, they tend to become rigid, and if there is any sign of rigidity the club head is more than likely to start first instead of the hands. It is a curious physical fact that if the hands and club head start back correctly they will both

be in a correct position on the return journey, and there will be no excessive pronation of the wrists.

Modern expert golfers do not take the club back nearly as far as the old-timers, since it has been found that a three-quarter back swing will give as much power as a full swing, and in some cases more. Thus we come to the top of the back swing and how best to prevent taking the club back too far. This is quite simple to achieve, provided that the last two fingers of the left hand retain a firm but not tight grip of the club.

I wish to dismiss the question of " Pivot " very briefly. If you allow the left heel to leave the ground as the club is going back, you will be able to turn the back of your shoulders to the ball. This movement, coupled with the use of the right hand in delivering the blow, will ensure that the ball is hit from inside to out, and consequently fairly and squarely in the back.

Very few golfers keep their heads still enough throughout the swing. The head should remain as motionless as is physically possible until well after the ball is on its way. If the head is allowed to sway back with the club it will have to sway forward again, which will at once lead to disaster. Particular notice should be taken of the position, after impact, of the heads of all great golfers of our time. And remember that no one can play accurately unless he stands still.

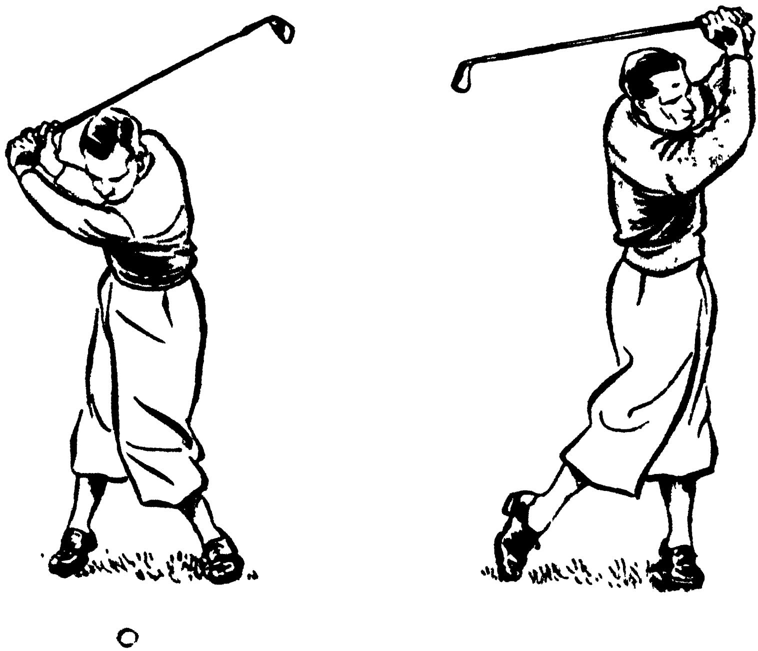
Too much is often made of the follow-through and those who practise it do it to such an extent that they force their eye off the ball at the moment of impact. The great thing to remember at impact and immediately after is to ensure that the left arm does not bend until the club head has travelled at least two feet past the ball. On the other hand, a nice easy follow-through looks agreeable and finishes off the job.

Lastly, we come to the rhythm of the swing. All the great artists to my mind appear to have a beautiful rhythm. It is essentially musical and makes the *tout ensemble* a gentle, easy, natural performance. I am convinced that this can be acquired by almost all who play the game, but on the other hand, it is seldom that we ever see a golfer with a really rhythmic swing. The secret lies in taking the club back slowly and, as it were, winding oneself up quietly into the striking position before letting fly. Oddly enough, from the title of our national anthem " God Save the King " the basis of a rhythm can be acquired. If we time our swing so that

whilst taking the club back we repeat "God-save-the-", we shall have wound ourselves up slowly. On the way down we can say "King", with a snap. Try to be smooth. This applies from tee to green.

Driving.

What is the object of the drive? as they say in the army. Clearly, from the tee this should be to hit the ball on to the fairway into such a position as to make the second shot as easy as possible. I once overheard Bobbie Jones say in the clubhouse at Sunningdale: "I



Top of swing with No. 2 iron — Finish of full shot with No. 2

Driving

cannot understand people in this country calling themselves scratch and plus golfers before they have learned what ought to be the easiest part of the game, namely, to hit the ball down the middle of the course from the tee." How true! Even in these days one comes across very few so-called first-class amateurs whom one could

honestly describe as being good sound drivers. One of the reasons for this is that on the whole our courses are too wide and in an enormous number of cases the rough is not nearly heavy enough. Thus one may say that the ideal training ground for a young player is a heather course where, unless tee shots are hit straight, a game of golf is misery.

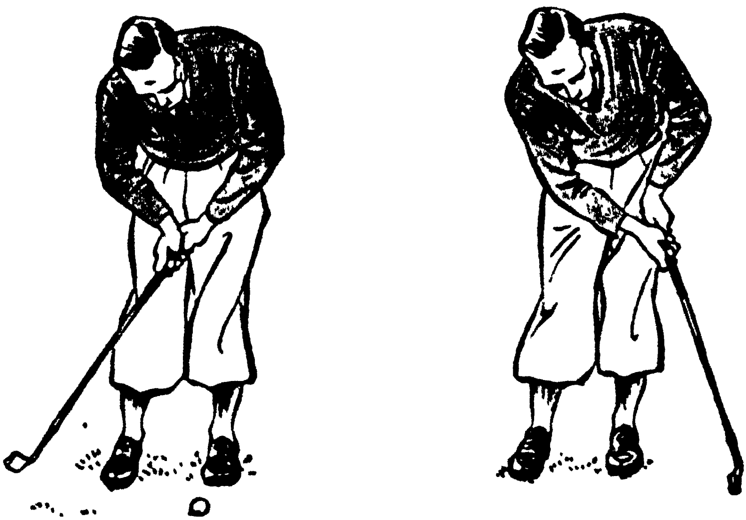
Generally speaking, one would advise young players to drive with an easy club, that is a fairly lofted brassie, for in so many cases the ordinary driver is a difficult club to use except for the expert player. Secondly, one should never be ashamed of driving the ball high, since to hit a low drive is one of the most difficult strokes in the game. Once confidence, through studious practice and experience, has been achieved, then a straight-faced driver may be used. Even so, I have for many years made a practice of using a brassie from the tee whenever driving down wind. The ball travels just as far as when hit with a driver and is much easier to hit straight. Hit the fairway at all costs from the tee and keep the ball in play.

Whereas the driver and wooden clubs are made with a wide flat sole and are intended to sweep the turf, an iron club is made almost in the shape of a knife and is intended to cut the turf. Even amongst the great—particularly in the case of amateurs; and this applies to Bobbie Jones himself - it is unusual to find in one man a great wooden club player and a great iron player. In the case of Jones, the greatest of all wooden club players, by comparison his irons were poor. Wethered, who is still a miracle of efficiency with an iron club, was generally a deplorable wooden club player, since he invariably took a divot with a club not meant for such a purpose. Cotton, on the other hand, is as good with wooden clubs as he is with irons. His standard of efficiency with both is unbelievably high.

As with wooden clubs, set out to hit the ball straight; up to a point the blow may be a descending one at the back of the ball, with a divot of turf being removed beyond the ball. Stand still, and punch the ball rather than sweep it along. Never overdo the " hitting down ", for it makes the stroke more difficult, especially on heavy turf. I believe the real secret of success with iron clubs is to keep the head down so long after hitting the ball as to have to search for it in the sky. If the head has done its job the ball will be found underneath the club head in the air at the end of the stroke.

Putting.

Having suffered much, and perhaps even more than most players, on the putting greens, and having practised for hours on end with no avail, I have reached the age when big golf is rapidly becoming for me a thing of the past. Nevertheless, I have at last learnt an effective method of putting, which I believe to be sound; and different versions of it are used by American golfers. Before de-



Putting

scribing the actual method, we must first of all consider the mental aspect of putting, and the short game. Where most of us fail is that at the outset we putt to get the ball into the hole, and as long as the ball drops we are satisfied that all is well. Now unless a ball is properly and scientifically struck with the putter it will not consistently travel on the intended line. When our eye is "in" we may achieve some success; when our eye is "out" results will be deplorable. Thus our one and only concern should be to learn to strike the ball properly and sweetly, just as a billiard player does. Never mind where it goes to begin with, just make it roll. And how are we to make it roll? It should be clear that if we impart top

spin a ball is more likely to keep the line than one which has a drag or back spin, or when it is slightly cut or hooked. Thus we must endeavour to hit the ball at least half-way up or even on the top.

As to the mechanics of the putting stroke, we must now examine them. To begin with, a normal grip is as sound as any other, though some prefer the reverse overlap, with the first finger of the left hand overlapping the little finger of the right. It should be clear that unless the club head is taken back straight, that is, on a continuation of an imaginary line between the ball and the hole - assuming that the putt is a straight one—it is not possible consistently to strike the ball in the direction of the hole. The easiest way, and perhaps the only way, to take the putter back straight is with the left hand, bending the left wrist in so doing. The right hand then partially takes charge, to strike the ball, but the left hand still has a most important duty to perform, and this to my mind is its most difficult function. As the right hand moves the club head towards the ball the left wrist gradually unwinds until the back of the left hand is in line with the back of the left forearm. Once this position has been reached the left hand, together with the left forearm, should travel towards the hole, enabling the club head to follow right through the ball and finish low near the ground, as in the illustration. So long as the club head strikes the ball half-way up it will be easy to follow through, but if the putter head so much as grazes the ground the ball is unlikely to be struck fairly and squarely, and consistent results are most unlikely. Similarly with chip shots and short approaches. One's only consideration should be to strike the ball in the middle of the club and smoothly. Finally, with these short shots one should consider: "Am I going to hit the ball off the ground or am I attempting to make it run all the way?" If the ball is to be hit in the air, we must always make up our minds as to the approximate place on the green, or just in front, upon which it is intended to pitch the ball. It will at first seem extremely difficult to achieve, but so long as we always have this at the back of our minds when playing little pitches or chip shots, accuracy will eventually come; therein lies the secret of the short game.

HOCKEY

1. MECHANICS

I shall assume that the reader knows the rules and understands the terms " reverse sticks ", " obstruction ", " wrong side ", &c.

As with cricket, so with hockey—the first thing is to hold the implement correctly. I am tempted to say that all you need do is to hold it naturally, but I have seen beginners (they are always left-handed batsmen at cricket, I think) place their left hand below their right. This is absolutely wrong. Otherwise, I think it is safe to leave the grip to the individual's own judgment, though it is important to keep the hands together (except occasionally in " flicking ", see p. 164).

A little manual on " Hockey for Girls " I glanced at recently contained the following sentence: " One-handed play is not seen in the very best ' circles '!" The somewhat nauseating pun would have been pardonable, perhaps, if the statement had been correct! To be just to the author, he had in mind right-handed play, I think, and certainly all hitting, and most dribbling, should be done with both hands. But in tackling and intercepting particularly, to be able to use the left hand only is the hall-mark of a good player.

Apart from interception, in which it is clear that you can stretch farther with one hand, left or right, than with two, the essential use of the left hand is to tackle an opponent who is on your " wrong " side. You are the left half, say, and the opposing outside right has the ball and is dribbling down the right-hand touch-line outside you. What are you going to do? Leave him and hope he will " fluff " his centre or hit it on to your shins without incapacitating you? Tackle him by running " across his bows ", tripping him up and hoping the umpire does not know the " obstruction " rule? Apart from this feeble *laissez-faire* policy, there is only one thing you can fairly do, and that is to transfer the stick into your left hand and endeavour to put it against the ball without touching your opponent. When you have learnt to do this you have learnt one of the prettiest and most satisfying moves in the game—the clean, " wrong-

side" tackle. If you have an opportunity of watching a game of first-class hockey, notice the left half and left back in particular, and see how they do it.

Now it may seem strange that I have mentioned so "advanced" a point so soon, but there is method in my madness. I wish to stress the importance of becoming "left-hand minded", as it were (for though, as has been mentioned, left backs and left halves are especially concerned, there are occasions when every player on the field—except the goalkeeper—needs to use his left hand), and to show why as well as how the stick should be correctly "reversed".

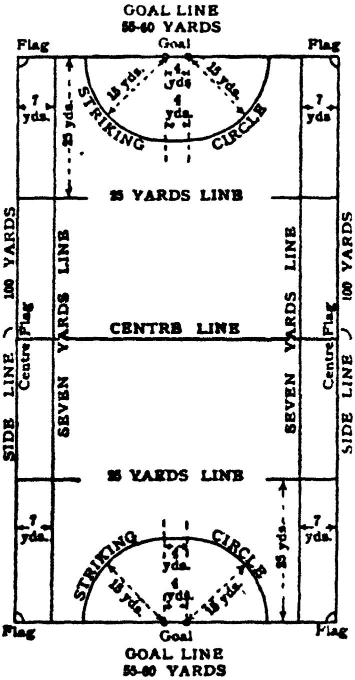


Fig. 1

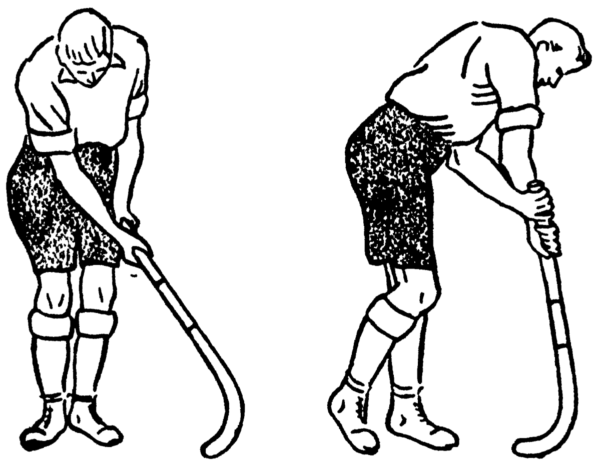
The flags at each end of the centre line must be 1 yard outside the touch line.

The 25 yards line must not be fully drawn but only its extremities (7 yards only to be marked at each end).

It is very common indeed to see hockey players reverse their stick by turning it over, so that before it is in the reverse position the back of the stick has faced the front (fig. 2). At Marlborough we call this "going over the top", and are perhaps too scornful of the number of quite good players who do it, including, incidentally, the Indians, who are, of course, the finest players in the world. But it should be pointed out that (*a*) they use a stick with much less "bend" than ours, and (*b*) they only make a half turn with it. The correct way, we think, is not to turn the stick over at all; the left hand slips farther under the "shaft", and really takes charge. ...fact, you practically (in many cases actually) transfer the stick into the left hand, and this not merely for tackling and intercepting, but for dribbling also.

So much for holding the stick, which seems to have led us into ...ers. Now for hitting the ball.

The more I see of hockey, the surer I am that the commonest of all weaknesses, even in supposedly first-class hockey, is slowness in hitting. This is partly due to thinking you have more time than you really have; and the amount of time you really have depends, of course, on the quality of your opponents, so that this weakness is particularly noticeable when a player who has been first-rate in his own class finds himself in better company. (The danger here is that he will merely think he is " off his game ", and so be none the



Correct Incorrect

Fig. 2.—Reversing the stick

wiser.) But slowness in hitting is also due to taking too big a swing. You all know the " sticks " rule, but I wonder how many have realized its implications to the full. It is not so much the danger involved in giving " sticks " that matters; deliberate " under-cutting " is more dangerous, " obstruction " a far worse foul. You may even have been surprised when watching first-class hockey to see how much " sticks " presumably good umpires allow. No, it is the slowness involved that matters, and I bet a lot of you had not thought of that.

It is because of the time saved in getting rid of the ball that most good players learn to flick, about which more anon. But there is no real substitute for the quick, crisp hit, and indeed one

of the finest centre halves of the inter-war years [1] was never seen (by the author, at least) to flick. Yet there is no place in the field where quickness in getting rid of the ball is more essential.

The *mechanics* of the hit seems to me something like a speed-up " iron " shot at golf—mostly wrist and forearm, and plenty of left arm. Keep the head and shoulders as steady as possible. Do not use a circular, scythe-like motion. I mention this because I believe it used to be taught, especially to girls—the idea being, presumably, to avoid giving sticks. It certainly does that—if it hits the ball at all. It inevitably contravenes the first principle of hitting any ball, which is to keep the head and shoulders as still as possible. You will find it difficult to hit a stationary ball hard with such a short swing as I advocate, but except for a free hit (when of course there is not the same hurry) the ball is rarely stationary when you want to hit it, and if it is already moving only the slightest bit in the right direction you should find that you can " speed it up " amply.

As for the flick, most beginners find it needs a great deal of practice to get the knack of it. Unlike the hit, there is little left hand in it, and I am not sure that it is not done with the stomach muscles more than anything else. At any rate, with the stick touching the ball—the essence of the flick is, of course, that there is no back swing at all—push with everything you have and try to follow through as if you want to keep the ball on the stick as long as you can. You may find it helpful at first to separate the hands. After watching many learners, I am inclined to think " flick " a misleading term. They always try to do it too jerkily, and thus fail to get their weight into it. But I have never seen anyone able to flick (or " push ", which I prefer) without assiduous practice. Remember to aim at length, not height. The " scoop " is a horrid travesty of the flick.

I shall not say much about stopping the ball. The bad old days when one was allowed to use the foot are past. One may still use the hand if one stops the ball quite dead, but with the possible exception of backs (see later, under " Tactics ") I am strongly against using it—unless, of course, the ball is in the air, when you certainly should use it.

It cannot be too strongly emphasized that hockey should be

[1] E. S. Hoare (Cambridge and England). It is only fair to add that J. K. Waydelin (Oxford and England), who played right half at the same time, rarely did anything except flick—and what a flick! They were rather like Jack Sprat and his wife!

played as far as possible on the ground. For this reason umpires should be lenient on the " hand-ball " rule, when the ball is stopped in the air. The player is doing his best to bring the game to earth again; the culprit, if any, is the player who gave it wings. Ordinarily the stick, of course, should be used and no hard-and-fast right or wrong method can be laid down. For myself, I like to try to stop the ball at some distance from me; partly because, if I miss it there, I *may* be quick enough to have another chance before it goes beyond recall, but more because, after being " stopped ", the ball usually spins on a little and, if I have stopped it too near me, I find it entangled with my feet. The only other hint I can offer about stopping is to be ready for doing so on the " wrong " side, i.e. have your stick in the left hand. This applies particularly to " interception " by halves and backs. The reason for this is, I hope, obvious: it is easy enough to clap the right hand on the stick if the ball does come on your right side, but to transfer it from the right to the left suddenly is not so easy. In other words, prepare for the worst.

We come lastly in this section to footwork. I have not left this to the last because it is least important—rather the reverse, although to judge by the little attention given to it many people would appear to think so. Yet stickwork without footwork is like a car without petrol.

It is perhaps worth mentioning what footwork does *not* mean. It does not, of course, mean kicking the ball so cleverly that the umpire fails to detect you. Not quite so obviously, it does not mean just running like the wind. It is extremely useful to be able to run fast, though it is worth remembering that quickness at starting—practically a mental quality—and changes of pace are more important. No; what is meant by footwork is getting the feet into the best position for hitting the ball, and getting there quickly. Let us take an example. You are an inside left and have the ball under control a yard or two from the circle. No other forward seems unmarked, so that if anybody is to score this goal it must be you. But there is a back in the way and you have got to get round him. You have learnt to reverse your stick quickly and without " going over the top ", so that you think you will round the back by hitting the ball to your left and . . . bang goes the whistle for " obstruction ", and bang go your visions of a glorious goal. Yet you were nearly right. To dribble past that back you *have* to hit the ball to the left, but you must move to the left, too, while still facing half right; and the later you can leave your movement the more chance you have, of

course, of beating your opponent, so that quickness of footwork is everything. But do not leave it too late. It should be in your mind at the same time as your decision what to do with your stick.

In defence, too, to be able to position yourself quickly will make all the difference to effecting a clearance under pressure. Yet how few practise this. Here at Marlborough, reputedly one of the "cradles" of the game, any day of the week in the Lent term you can see boys hitting a ball about to each other. Yet how rarely do you see one, instead of just hitting (probably with a slow, stately swing from a point well above his head) straight to another, tap the ball a few feet to the left first and then see how quickly he can turn (clockwise, of course) and hit it to him. If he did that about twenty times a day, he would really be doing himself some good.

Our space is getting short; so that is all we can devote to the "mechanics" of the game. We must now pass to "tactics".

2. TACTICS

It will be best, I think, to take positions separately.

1. *Forward Play.*

Forwards above all need to be masters of the mechanics of the game, and, in general, the farther left you are the more mechanics are required—outside left being usually reckoned the most difficult place on the field.

Controversy sometimes rages about the respective merits of the "square" pass and the "through" pass. In general, perhaps, it can be said that the through pass (through into a gap in the defence) should preponderate on a slow, heavy ground, the square pass (straight to the player—allowing for his pace, of course) on a fast, dry ground. One thing can definitely be said: a hybrid pass, diagonally from right to left across the front of a forward is no good to anybody, except the defence.

The through pass, especially on a dry ground, needs perfect timing. This means not merely that there must be "two minds with but a single thought" (since the recipient has to anticipate the pass), but the speed of the pass must be just right. For this reason, and because it can thus be more easily disguised, the through pass is usually flicked or pushed rather than hit. But I think myself it is overdone, and given a good firm surface, nothing can beat the

"short" passing game—if the players' mechanics are good enough. Through passing is too often a confession of weakness.

Forwards should always try to get themselves unmarked. This seems perhaps too obvious to mention, but beginners are strangely unintelligent about it. Somewhat akin to getting unmarked is remembering that the time you should run fastest is just after you have given a pass. This applies especially, of course, when you have been behind the man to whom you have passed; another very obvious point, but oddly overlooked.

Remember to tackle back. That is to say, when you have been robbed or your pass intercepted, chase your opponent until he has disgorged his ill-gotten prize. You may even get it back again; at least you will worry him enough to heighten considerably the chances of his fluffing his pass. Many times I have seen a less skilful side win a match because its forwards have refused to give up. It is the one branch of the game in which no skill is required—simply energy and courage. And if you do not do it when you are young, you will never do it.

Finally, I am frequently asked for some "tip" for scoring goals—an admittedly rather vital function of forwards, and one in which so many, especially at school, fail. I have tried to oblige, mentioning in particular preparing yourself mentally for shooting at goal before you even reach the circle. But truth to tell, there is no tip; if you fail you just are not good enough; that is to say, neither your footwork nor your stickwork are quick enough, and you almost certainly take too big a swing (see p. 163). The golden rule, perhaps, is: "However much time you think you have for making your shot, halve it."

2. *Half-back Play.*

Mechanically there is a big difference between right half, the easiest place on the field (except near to or in your own circle, where considerable dexterity is needed, especially with the feet, to avoid "clearing" across your own goal mouth), and left half, which is probably the second hardest position on the field (and almost impossible at roll-ins.) The centre half must be a man of all parts; he is the most important player on the side.

At half, however, lack of skill in stickwork and footwork can be at least partially compensated by headwork—especially at wing half, where positioning is half the battle. The wing half's man to

mark is the opposing outside forward. When the inside forward dribbles towards him he will be sorely tempted to go for him. But he must not—even if it involves beating what may seem to him an ignominious retreat. It is his job to maintain his position between the ball and the man he is marking. The only exception is when the inside forward is in the circle; then it is anybody's business to try to prevent his shooting. The centre half's man is, of course, the opposing centre forward; but, especially if they bunch, he may be able to deal with all three inside forwards. He should not normally go out to the wings; he has plenty of ground to cover as it is.

So much for defence. In attack the most important thing to remember is to get rid of the ball quickly. Writing as a forward (or ex-forward), I cannot over-emphasize this point, for the temptation to bring the ball upfield under the impression that you are " drawing " a man is seemingly almost irresistible. You may succeed in drawing a man if he is fool enough to be drawn. You are much more likely either to give your opponents time to get back in defence or to put your own forwards offside. So make it a rule to pass hard and early—normally straight to one of the insides, as being the only two forwards likely to be unmarked. There should be time for a quick glance to see where they are before (not while) you hit or flick. If you can hit it right across to the opposite inside (right half to inside left, left half to inside right) so much the better, as we shall see when we come on to " back " play; but do not do this anywhere near your own circle, as an interception in midfield may prove fatal.

Finally, it is hardly necessary to add that, if boundless energy is your strong suit, " half " is your place.

3. *Back Play.*

A first-class back requires nearly as much mechanical skill as a player in any other position—particularly footwork and left-handed stickwork. But you can become a respectable back with little but a " good eye ", and a quick hit, if you master the tactics of back play; similarly, you can have all the stickwork in the world and yet be a poor back, if you do not master them.

A back's primary job is to stop the ball. For this reason, on a bumpy ground, if he distrusts his " eye " and is sure he has plenty of time, it is not a bad thing to use his hand. But he must expect to find umpires very strict on " hand ball " (I am writing, of course, of

occasions when the ball is on or near the ground), and personally I think it better to learn to trust your stick and eye. Having stopped it, you probably find an opposing forward upon you, but it is usually easy enough to tap the ball to one side and watch him blunder past; so easy, in fact, that bad backs, who think they are rather good backs, try to trick an on-rushing forward when they have plenty of time to get their hit in before he arrives. They may get away with it nine times out of ten; the tenth time they are unlucky, and that will probably be the goal which loses the match.

They are more likely to be caught with the ball by a forward coming back or sideways to rob them; in this case, they have taken too long in hitting—probably our old enemy, too big a swing. Sometimes a back is too hard pressed to be able to do more than flick the ball towards the touch-line. It is here that collaboration between back and half can be so useful, particularly on the left, where the job of positioning yourself to hit upfield is so much harder.

This leads us on to what is one of the most important features of defensive play in hockey, namely covering. A left back and a left half, say, who know each other's play, will always be covering each other; when one is up, the other is back. Similarly, the two backs should never be standing " square ". On whichever side the ball is, that back goes up while the other comes across at an angle of about 45 degrees behind him. Obviously, if the ball is swung right across the field suddenly, there must be a moment when the backs are square, a moment which may let a fast centre forward race through the gap. It is for this reason that the " cross " pass, especially from left half to right inside, was recommended in attack (see p. 168). But quick-moving and quick-thinking backs will see to it that it is a very short moment before they are covering again. The whole art of positioning, at both half and back, is that you move up when the ball is on your side of the field—there should never be a big gap between halves and backs; do not be afraid of coming up the field—back across when it is on the opposite side.

Last, but far from least, we have the gentle art of " tackling ".

To the half back, tackling presents no special problem. Being between his man and the ball, he hopes to intercept; if he fails, he merely has to pound after him and tackle him from the side (in the case of the left half, probably from the " wrong " side—fig. 3). But the back is almost certainly behind his man and has to tackle him

" head on ". The instinct of the inexperienced (especially if, as so often is the case, he is a he-man rugger player being asked to play this silly, effeminate game!) is to rush at him, but nothing is more fatal and there is nothing the good forward finds so easy to play against. In three words, my advice to a back is " Don't commit yourself ". Perhaps one can condense it into one word, " Hover ". I am assuming that the forward has the ball under control. If you are quick enough to get on to him before he has it under control, or even to nip in in front of him before he gets it at all, so

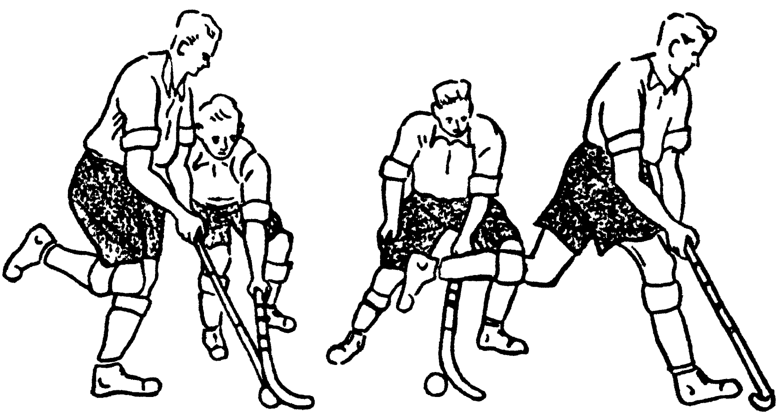


Fig. 3.—The " wrong " side tackle

much the better, of course. But if he knows his job he won't let you do that very often—assume then that he has the ball under control. Come up on to him (note that " non-committal " does not mean retreating, as we urged the wing half to do when the inside tries to " draw " him), but hover near him ready to lunge with your stick at the psychological moment, i.e. the moment he doesn't expect it or has let the ball run too far ahead or is adjusting his footwork. Feint sometimes; in fact, do everything, short of booing him, to put him off his stroke. I once played against a back who carried Fabian tactics so far that he came up to me, turned and ran with me, waiting till I started to shoot before tackling me—and very effective it was. But he must have known what a slow runner I was; you need to know your man to go quite as far as that. But at least it illustrates the principle of the thing.

There is one exception, however, to the " Don't rush at your man " rule, and that is, when he is in the circle. It is the back's first duty to keep the forwards out of the circle; which brings us to the goalkeeper, whose duties begin when others have failed to do theirs.

4. *The Goalkeeper.*

Since I have already exceeded my ration, I shall have to treat of the goalie in somewhat telegraphic form. This does not mean that I regard him as unimportant, nor that goalkeeping is a child's game. But it is true to say that he does not require any stickwork; in fact, the first (and by no means the easiest) thing he has to learn is not to use his stick. Indeed, he would be better off without it, but unfortunately it is in the rules that he must carry it.

The main qualities required by a goalkeeper are courage and judgment. Quick decisions will be needed—to come out or stay in? In general, " If in doubt, come out ", but always stay in if your opponent is going to shoot from an acute angle. If you are correctly placed, i.e. right up against the nearer post, it should be impossible for him to score. Remember that the goal and circle are your particular responsibility, and the other defenders should do what you want them to therein. If you want a back in goal with you at a " corner ", say so. If you want to come out and kick, say so—in a confident voice; you are the boss.

Hold your stick in the right hand only, keeping the left ready to deal with any " aerial " shot. Finally, remember that it is as important for you to keep your head down when kicking as it is for the rest to keep theirs down when hitting.

LAWN TENNIS

Introduction.

When I was at school, lawn tennis was considered to be a rather unsuitable game for boys to play, because it was said to encourage individualism and not team work. Boys were made to play football and cricket and other team games, but lawn tennis had to be learnt in the holidays. Fortunately, this attitude of the schools has been greatly altered, and it is now realized by most people that not only does tennis teach the value of team work, but brings out other desirable qualities.

To play tennis well you will need patience, determination and courage, and in doubles you cannot be successful unless you play in close accord with your partner. I consider that it is desirable for all boys to learn to play tennis, because it is played so universally, and wherever you are you can nearly always get a game. This is not so easy in the case of games such as football or cricket, where large grounds are required, and many more people to make up a match, whereas there is hardly a town or village in the country where there is not some sort of tennis court, and in most places there is a club where you can play even though you have not arranged your game beforehand.

Lawn tennis again is generally thought of as a summer game, and it is admittedly better played in the summer, but on nice days in the winter it is perfectly possible to get a great deal of enjoyment and exercise from a game of tennis.

Choice and Care of Rackets.

It is most important to have a racket that suits you. Choose your racket carefully, therefore, making certain that it feels comfortable in your hand when you swing it, and appears to be well balanced. If it feels too light or too heavy it will not suit you. The size of the handle is important. You should be able to grasp it firmly with your fingers nearly meeting round it. It is better to have a handle

too big, rather than one that is too small. When you have bought your racket you must also buy a press in which to keep it. This is most important, as without a press the racket will warp and lose its shape. Always put your racket in its press when it is not in use. If you have a mackintosh cover, do not put it in the press; this only damages the cover and does no good to the racket.

Fundamental Principles.

As in most things, there are certain principles of lawn tennis which are fundamental, without which you cannot play the game even moderately well. A boy learning to play, therefore, should learn these principles, and go on practising them until it becomes automatic for him to follow them.

The most important thing is to hit the ball over the net. This seems an obvious remark, but it is astonishing how many people constantly hit the ball into the net when playing. Remember, that unless the ball goes over the net it has no chance of winning a point, and it is therefore better to hit it out of court rather than into the net. You will find it very tempting to hit as hard as you can, particularly if every now and then it goes into court and leaves your opponent standing, but this one good shot is not much use if most of the others go into the net. A beginner should therefore hit the ball gently at first so as to be certain of getting it over the net. Later, when he is reasonably certain of hitting most of his shots over the net he can start to hit harder.

The next fundamental principle is to watch the ball. It is no good watching the ball only as it is coming towards you; you must watch it until after you have hit it, and it is particularly important to watch it at the actual moment when the racket hits the ball. If you take your eye off the ball at this moment, you probably also lift your arm and your body and make a bad shot; so watch the ball all the time you are making your stroke, and look up to see where it has gone only after you have hit it.

The next thing to learn is to get your feet into the right position when making a shot. This is known as footwork. The most important thing is always to get your feet into the same position for the same shot. This is even more important than getting your feet into the position which is considered correct by the experts. The best way of learning uniform footwork is to hit the ball up against a wall,

only making a shot when you have got your feet into the right position. Do not get too close to the ball when you hit it. You must be able to swing your racket with the arm at full stretch, and with the body more or less upright. To do this, you will have to keep on your toes and move rapidly into the right position for each shot.

This brings me on to the next point, which is to stress the importance of practice, especially in the early stages. You must go on practising, and remember that if you want to be any good at the game you must spend time in practice, if possible against players better than yourself, and not be tempted to take on weaker performers all the time, merely so as to have the satisfaction of winning.

You must concentrate too when you are playing. If you are thinking of something else, or talking to a friend in between the shots, you will never do any good, and the time spent in practising will be wasted. Boys will do better to play for short periods at a time and to concentrate hard during those periods, rather than play in a lackadaisical way for hours on end.

Another important point is always to hold the racket tightly when you are hitting the ball. This is particularly important when the ball is coming fast towards you. Loosen your grip between shots so as to be ready to change your grip for a different type of shot, but never loosen it when you are actually hitting the ball.

Another important thing is always to play the same shot in the same way. This means, of course, that you should actually be standing still at the moment you hit the ball, and this shows how important it is to move quickly to the place where you are going to have to hit the ball, so as to get there in time to get your feet into the right position when hitting it. This sounds rather complicated, and I shall refer to it later when describing the various types of shot.

These are the most important principles for beginners and young players to remember and follow. All good players carry out these principles automatically, and this they have only achieved through constant practice. Boys must realize that hard work is required to achieve success at lawn tennis as at all things.

The Forehand Drive (fig. 3).

A boy starting to learn lawn tennis will probably find that it comes most naturally to him to hit the ball on his right-hand side,

that is, of course, if he is right-handed. (For a left-hander, the reverse applies in every instance in the following section.) This shot is known as the forehand drive, and for most players is their strongest shot. There are some people who naturally have a better backhand; others find that volleying comes to them most easily; some players use two hands for some of their shots. These are exceptions, however, and the beginner, unless he finds that some other shot is naturally his best, would do well to cultivate a strong forehand drive, and when playing should try to make his winning shots with the forehand.

For this shot, as indeed for all shots, a correct grip of the racket is the first essential. A grip that is naturally comfortable is probably the best, provided it does not differ too much from the orthodox. Hold the racket as near to the end of the handle as is consistent

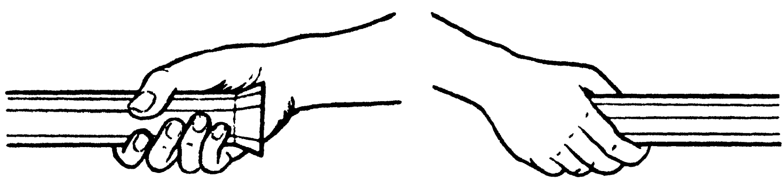


Fig. 1.—Forehand grip

with a firm grip. If you do this you will find that the leather end of the handle rests against the soft part of the hand, between the base of the little finger and the beginning of the wrist. By gripping near the end of the racket in this way your reach is increased, and the amount of force necessary to produce a shot is less, owing to the greater leverage that is obtained than if the racket is gripped lower down the handle. The racket usually has two broad sides parallel to its faces, two narrow ones at right angles to these, with four corners cut off to join these sides. The body of the hand should be behind one of the broad sides looking from the direction of approach of the ball. The fingers should grasp the handle firmly underneath, and up on the other broad side, with the thumb over the top of the handle, so that it nearly meets the fingers coming round from underneath. (See fig. 1.)

The grip I have tried to describe should produce a forehand drive hit without any spin, which is known as a flat drive. Many

players employ either top spin or undercut, and indeed the complete player should be able to produce, if necessary, all three types of drive. To impart top spin to the ball the racket should be gripped rather more underneath the handle than described above, and to impart cut the hand should be rather more on top of the racket.

I shall say no more about these variations of the normal drive because I am certain that it is best for a boy to perfect the orthodox

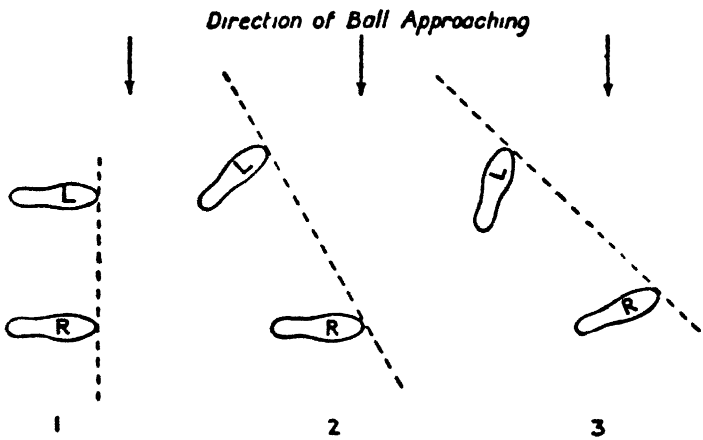
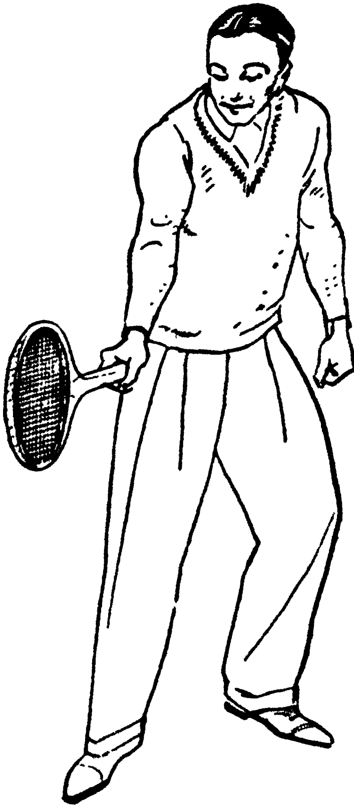


Fig. 2.—Variations of stance

shots to start with, before trying variations, unless he has a strong natural inclination for some other type of shot.

So much for the grip for the forehand. Equally important also is the correct stance or footwork. The need for correct footwork has already been mentioned. It is important to realize that shots must not be produced merely by swinging the arm. The body must also be moved and its weight transferred at the right time, so as to impart additional speed to the shot, and to ensure that the direction is correct. Unless the footwork is right the body swing will be wrong and the shot will fail. To make a forehand drive you must on no account face the net; your left shoulder should point to it, with your body facing sideways, and the feet should be more or less parallel to the net, with the line joining the toes approximately at right angles to the net. You will see if you try the position just described that it enables you to watch the ball, and you will re-

member the importance of this. It also ensures that the racket travels on the same line as the ball for as great a distance as possible, and enables you to bring the weight forward as you hit the ball, and to follow through correctly (fig. 2).



You are now holding the racket correctly, and your feet are in the right position. All you have to do now is to swing the racket and hit the ball. This is the most important part of the shot, but it cannot be done properly unless your grip and footwork are correct. Your swing must be continuous and rhythmical; a jerky swing is useless. The swing consists of taking the racket behind the right shoulder and then bringing it forward to hit the ball, and carrying on in front of the left shoulder, the last part being known as the follow through. You must learn

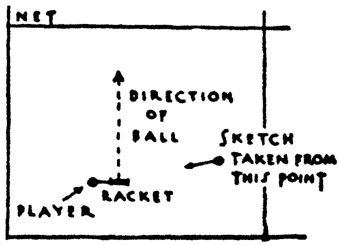


Fig. 3.—Forehand drive

to start your back swing at the right moment, so that you can bring the racket forward in a continuous movement, so as to hit the ball when it is opposite your right shoulder. This timing of the swing can only be learnt by practice, and, as I have said before, the best way to learn is to practise against a wall by yourself. You will soon find out that you have to move your feet to get to the

right position to hit the ball, and you will learn to start your swing at the right moment, so that the backwards and forwards movement of the racket is continuous.

Another important point is to swing the racket at the same height all the time. If you have to change the height of the racket at the last moment as you are swinging, you will lose all control of the shot. The height of the swing depends on how high the ball approaching you is going to bounce, and this, of course, you will have to estimate. You can learn to do this only by practice. Swing the racket back as far as is comfortable and twist the body slightly, as this will enable you to get more weight into the shot. As you swing the racket forward twist your body forward, and when you actually hit the ball your arm must be straight and your wrist stiff. Keep the head of the racket above the level of the wrist or you will lose control. This means that you will have to bend your knees to hit a low shot. The striking of the ball should be part of the forward swinging of the racket, rather than a definite hit. This smoothness of swing will enable you to adopt a uniform stroke, and will help you to time the shot correctly. As the racket comes forward you can increase the speed of the swing so as to hit the ball harder, but you must do it smoothly.

After the ball is hit, the swinging racket must continue so that its head goes forward and then upward over the left shoulder, which should have come round so that you are facing towards the net. Remember that the racket head must be travelling at its fastest speed when the ball is actually hit. This means that you will need a fairly long follow-through so as to avoid slowing up the speed of the racket until after you have actually hit the ball. Let the arm bend after hitting the ball, but on no account do this, nor lift the racket, until you have actually hit it.

You must be ready, immediately you have finished your shot, to move to another part of the court to take the next shot, and a long follow through, with the body weight coming round smoothly, will enable you to do this. After you have learnt how to make this shot when standing still, you must gradually learn to make it when on the move, as you will not always have time to make the whole of the shot at a standstill. By this I do not mean that you should be moving at the actual moment of impact, but the swing must start before you reach the actual position where you are going to hit the ball. Your feet should be stationary at the moment of impact, but as

you improve you will find that the time for which you are standing still gets less and less, until eventually the approach to your position, the swing and follow through, and move to your next position, become all one continuous movement, with just a momentary stop as you hit the ball.

Beginners should start by hitting the ball at the top of its bounce or later, as this will give them more time to prepare for the shot. As you improve, so you can hit the ball earlier in its flight. Do not try to do this too early, even though you see good players hitting the ball half volley. You cannot become a champion without going through the early stages of development and practice.

There is much more that can be said about the forehand drive, but I think that is enough for a start. Concentrate on learning the basic principles which I have described, and practise until you follow them automatically; then you can try variations if you like.

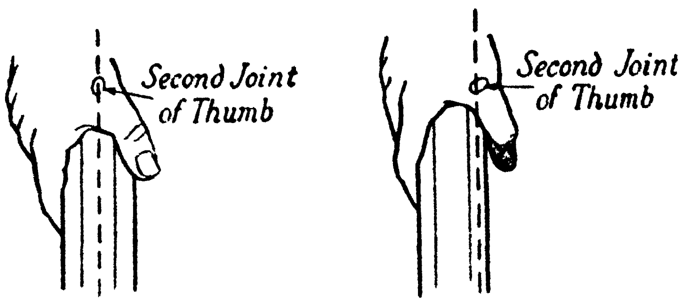
The Backhand Drive (fig. 5).

The backhand drive is the name given to the shot required, in the case of a right-handed player, to strike the ball on his left-hand side. In many respects this shot is the opposite of the forehand drive, and in the ensuing description it will be seen that a player will do well to play the two shots with similar swings, so as to make for uniformity of stroke production. Most players find the backhand shot more difficult than the forehand, and beginners will be well advised to cultivate a steady backhand, so that they can be reasonably assured of returning the ball over the net, and to await the opportunity of making a winning shot with the forehand drive. Later on you may like to try to develop a stronger backhand, but for the average player steadiness should be the first consideration. Many players who have a strong forehand and a weak backhand run round their backhand shots, that is, they move quickly to the left of the court to take the ball forehand instead of backhand. It is a mistake for a beginner to get into the habit of doing this, because it is definitely a confession of weakness, and a competent opponent can nearly always overcome a player who relies on this. You will never be able to avoid backhand shots altogether, so you might as well learn to make them from the start and acquire at any rate a reasonable shot.

The grip for the backhand should be different from that for the

forehand drive. The hand should be brought rather more on top of the handle, and the thumb along it, rather than round it, as was advised for the forehand (fig. 4).

This grip gives more support and makes for a stronger shot, but if the hand is brought round too much, you will find that it is impossible to swing fully, with the result that the shot becomes more of a push. This is not desirable, as it is best to develop a continuous swing for the shot. Weight distribution, which depends on correct placing of the feet, is most important, probably even more so than in the case of the forehand, as the shot is usually a less natural



Forehand grip Backhand grip

Fig. 4

one. When making a backhand drive, you should face the left-hand side of the court, with the right foot well across so that when playing a shot from the centre of the base line, the line joining your two feet points towards the left-hand post of the net. The ball should be struck when it is opposite your right shoulder, but remember that this means that you need to be rather farther back in relation to the bounce of the ball when making a backhand than when making a forehand, since the ball should be struck when opposite the right shoulder in each case. The sequence of movements to produce the backhand swing is much the same as for the forehand, with the necessary reversals of position. You will not be able to swing the racket back horizontally because your left arm and side prevent this, but you should bring it back above the horizontal, although the racket should be moving horizontally when the ball is struck. It is extremely important to keep the head of the racket well up when making a shot. Failure to do this means loss of control, and probably results in a sort of jab rather than a proper swing. Keeping the

racket head above the level of the right wrist forces you to swing properly in order to make the shot. For a start a beginner will be well advised to hit the ball rather later in its flight than in the case of the forehand, as most people find it rather more difficult to get into

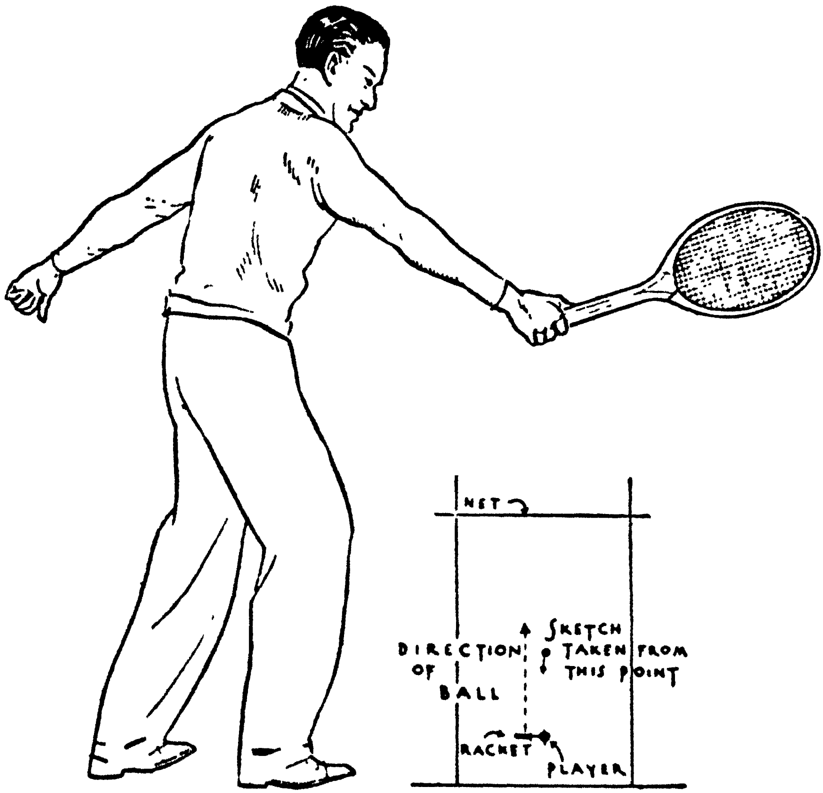


Fig. 5.—Backhand drive

the correct position, and need a little more time to do so. Start off, therefore, by striking the ball after it has passed the top of its bounce, and make certain that your stroke production is correct.

I have tried to describe a shot made with a flat racket, so that the ball is hit without spin. A useful variation which many players find more natural than the flat drive is one made with under spin or slice. This is produced by inclining the face of the racket backwards,

though otherwise the shot is made in the same way as described. The chief advantage of this shot is that the ball does not bounce very high, and may be difficult for your opponent to return, and many people also find such a shot easier to control than the drive without spin. The speed of the shot, however, is reduced, which is a disadvantage, although it may be outweighed by the greater accuracy of the shot.

The Volley.

A volley is the name given to the shot when the ball is hit before it has bounced. All boys must learn to volley, as the shot is an essential part of the game, particularly in doubles. The principal benefit to be gained by volleying in a single is that it enables you to finish off a rally more quickly and decisively than can be done by a ground shot. Try to manœuvre your opponent out of position by the accuracy of your drives from the back of the court, and then when you think he is likely to be in difficulties, go in towards the net, so that you can strike the ball downwards, and at an angle from which he will not be able to return it. By doing this you give your opponent very much less time to get into position for his shot. You may make him take his eye off the ball to see what you are doing, and in any case if he hurries over his shot, he is likely to make a bad one. You also shorten the rallies so that you conserve your energies, and as the volley is essentially an attacking shot, you tend by using it to establish a moral superiority over your opponent, which causes him to make more and more mistakes as the game goes on.

Now if you are confronted with a player who specializes in volleying, your best course is to get into the net first, and force him to make his shots from the ground, thus upsetting his normal game. Do not be discouraged if your opponent makes some brilliant passing shots at the start of the match. He may not be able to continue doing so if you persist in your attack, and it is quite likely that for every winning shot that he makes he may make several outright losers. The most important point to remember when volleying is that you should make your shot from as near to the net as possible. You must not hit the ball before it crosses the net, as this is a foul shot, but by hitting it almost immediately afterwards you gain the advantage of being able to hit the ball downwards, and at a sharp

angle. It is no good trying to volley from near the service line, as your opponent has plenty of room and angle to put the ball out of your reach, and anyway your shot is bound to be defensive from this position. Remember that volleying is an attacking shot. If you are going to make a defensive shot, make it from the base line after the ball has bounced. It is important to choose your moment for going to the net to volley. If you make a poor shot your opponent is likely to have plenty of time to pass you as you come up. Only go in on a good length shot, that is, one that pitches somewhere near your opponent's base line, as this will give you more time to get to the net. In nine cases out of ten when you are passed at the net, it is because you are not near enough to it. Once you have decided to go in you must not hesitate to get as near to the net as you can. Of course, one answer your opponent may make to your coming to the net may be a lob, that is, a shot over your head, which you may not be able to reach. You must always be ready, therefore, to run back to take such shots, but do not let the fear of a lob retard your approach to the net, as this will cause you to be caught half-way, which is fatal.

The grip for the volley should be the same as that for the ground shots, so that all forehand shots are played with the same grip, and similarly for the backhand. If you hold the racket differently for forehand and backhand, you will have to learn to change your grip very quickly to make a backhand volley, as otherwise you may be caught with the wrong grip, which will ruin your shot. To practise, you will need a friend to help you. Stand on opposite sides of the net and about two yards from it, and hit the ball to each other, gradually speeding up as you improve. You will not have time to make a long swing when volleying. Shots should be made with a short crisp stroke, in which most of the power comes from the wrist, which should be flexed for this shot, and not kept stiff, as was recommended for the ground strokes. Cut short the follow-through, so that the racket finishes only a foot or so in front of the body, thus giving yourself time to get ready for the next shot. Follow through in the direction in which you want the ball to go. The distribution of weight should be much the same as for the ground shots, and it is almost equally important to face sideways rather than directly towards the net. Keep on your toes when volleying, so as to lose as little time as possible in moving from one position to another. Take the ball rather in front of the body instead of opposite

it, as in the case of your ground shots, and watch the ball more carefully than ever.

Never let the head of the racket drop below the wrist when volleying. If you do, you will find you cannot use your wrist properly and the shot will probably finish in the net. If you have to take a shot that comes straight towards your body, you must move sideways in time to be able to play it at one side or the other. You will not always be able to play your shots with your right arm straight, and indeed many of your volleys will be played with a bent elbow, owing to the short time available to get into the ideal position. As far as possible, however, you should aim to place yourself so far away from the line of flight of the ball that you can have your arm straight. A firm grip is most important when volleying, particularly if the ball is coming hard towards you. You must learn not to be nervous of hard drives aimed at you when close to the net. I remember finding it difficult to avoid nervousness on my first appearance on the Centre Court at Wimbledon. Pat Spence and I were playing Borotra and Brugnon, who hit the ball hard and straight at me whenever I was at the net, and at first I did not return many. After a while, however, they gave it up, as I began to deal with their shots as I got over my nerves. If you play your stroke as I have advised, you will find that your return gains speed from the force of your opponent's shot. When striking a ball that is travelling slowly you have to make all the speed yourself, so that really a shot approaching you fast is an advantage to you.

So far I have considered only volleys that are taken fairly low, but you must also learn to deal with lobs. A reply to such a shot when taken on the volley is called a smash. The swing for this shot should be the same as for your service, which I will describe later. The grip for the smash and for the service should be the same as for your forehand drive. In making a smash the ball should be struck when it is directly over your head, and your arm should be straight at the moment of impact, because only thus can you employ your full force in making a shot. Watch the ball very carefully, and follow through in the direction in which you wish it to go. Footwork is most important, particularly as you have to move backwards to get to the right position. When practising with your friend get him to send you a few lobs, mixed up with the low shots, so as to get practice at moving backwards. The smash is essentially an attacking shot and the ball shoulo be struck hard, although you

must not allow it to degenerate into a blind swipe. You must also learn to watch the ball until it is over your head, that is, of course, if you have got into the right position quickly enough. Many easy smashes are missed, and usually at vital points in a match, owing to the player's impatience to make a shot, leading him to hit the ball when it is well in front of him, so that the shot finishes in the net. If you cannot get back quickly enough to take the lob when it is in the air, you will have to run right back and take it after it has bounced, when your return should be a drive. It is far better, however, if you possibly can, to volley a lob, because by doing so you maintain your position at the net. The whole purpose of lobbing is to drive a volleyer away from the net, and it is, of course, particularly effective against a man who gets in close to the net very fast. If you have to take a lob after it has bounced, you will, in many cases, find that your opponent has taken the opportunity to come to the net, in which case your best reply is probably another lob. I have not previously described how to make a lob, and this is a convenient opportunity to do so. Use the same grip and stance as for a forehand and backhand drive, as the case may be, but let your forehand swing start rather low, so that the racket is travelling slightly upwards when the ball is hit, thus lifting the ball high into the air. You will not need to hit the ball hard, and your follow through can be considerably cut down from that of the ordinary drive. A perfect lob is one that passes over your opponent, just outside his reach, and pitches near the base line. One that is very much higher than this, of course, gives him more time to get back to take it, and one that is lower or that pitches very much short of the base line will provide him with an easy smash. Once again, practice is the only way in which you will find out just how hard to hit the ball.

The Service.

The service is the name given to the shot which opens the rally, and a good service is therefore an advantage to the server, who may gain the initiative in the rally by means of it. It is usual at the start of a match to toss, the winner usually serving first; thereafter the opponents serve in alternate games. The aim of most players is always to win their own service, and they regard it as bad if they lose a game when they are serving; this applies particularly in doubles. It is as well to cultivate this frame of mind, because if you

lose one of your service games and then fail to win the next when your opponent is serving, you may be three games down. When serving, you can, of course, vary your position, so that the ball approaches your opponent from a different angle. This angle of approach, and accurate placing of your service, are just as important as the speed of the shot.

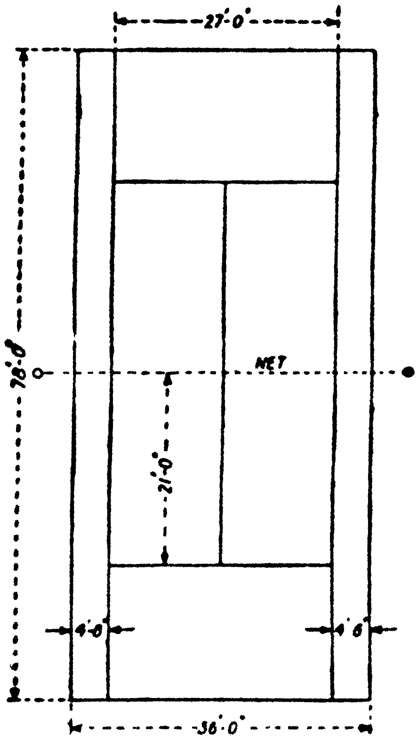


Fig. 6.—Plan of a lawn tennis court

Most players have a fast first service, and a slow second service. This is all right, provided the speed of the first service does not lead to a very large proportion of faults, and provided the slowness of the second service does not enable your opponent to make a winning shot from it. Beginners would do well to learn accuracy first, before going in for a very fast service, and you will find it a decided advantage to have a reasonably good second service. Remember

also that a double fault is a cardinal sin in tennis. It is nothing more or less than a present of a point to your opponent. A double fault, where both services find the net, is particularly bad. Such shots do not even have a chance of going into the court.

There is a large number of varieties of service, but I shall here describe only the one when the ball is hit with little or no spin. I do not advise boys to learn other variations until they have got well out of the beginner's stage. The grip should be the same as for the forehand drive, and the racket must be held firmly throughout the shot. Hold two balls in your left hand—on no account try to hold three, as you will see many older players doing; boys' hands are never big enough to do this. You should learn to hold two, however, right from the start, as it is a great nuisance if you have to fetch another ball, should your first service be a fault. The first thing to learn is to be able to throw one ball into the air while retaining the other in your hand, and it is as well to learn this without trying to hit the ball. The way the ball is thrown into the air is very important, because it is necessary to throw it to the right height for striking. Some people throw the ball very high, and strike it when it is falling. It is best, however, to strike it just as it starts to fall, so you must learn to throw it just high enough to enable you to do this.

When serving, you should face more or less parallel to the base line, your left foot just behind the line, and your right foot behind this again, so that the line joining your two feet is approximately parallel to the side lines of the court. To start your swing, bring both your arms to your left towards the net, and support the head of the racket with one or two fingers of the left hand, in which you will have two balls. Swing the racket downwards and backwards; at the same time swing the left arm down to the left side. As the racket swings back beyond the vertical bring it up behind your right shoulder, and then behind the head, and allow the head of the racket to fall back almost to the horizontal position, pointing behind you. As the racket is coming up in this way, so you should bring your left hand forward again and upward, and throw one ball up into the air when your hand is about level with your shoulder. You will have to find the exact point at which to release the ball, so as to suit your swing. Now bring the racket forward again and raise your arm to the vertical position, which will bring the racket head as high as you can get it. If you have thrown the ball up correctly,

you will then just be able to strike it at this point. This rather complicated movement will be found simpler when you have got into a rhythm, without which your service is not likely to be very good. The back swing must be fairly slow, so as to keep the rhythm, but the speed of the forward swing, which controls the pace of the service, should be greatly increased as you become more practised. It is important to strike the ball at the highest possible point so as to have the maximum amount of court into which to hit it.

This description may seem very complicated. You will probably be able to follow it, however, if you first watch someone serving and then refer to my explanation. The follow-through is important, and consists of bringing the racket forward and downward in the direction in which the ball is travelling, finishing up to the left of your body. A good follow-through ensures that your service does not lose speed by a slowing up of the racket before the ball is actually hit. A good service is a great asset, but accuracy and freedom from double faults are the most important factors. These can only be ensured by having a swing that is always the same. Use the same swing for both your first and second service, and do not be tempted to let your second service degenerate into a sort of push, which is adopted by some players as a safeguard against double faults. Learn from the start to swing properly, and you should get the required result without it being necessary to adopt any such device. When making the swing described above, the body should be bent backwards slightly as the racket is swung back, and then brought forward again as the racket comes forward. This enables you to get the weight of your body into the service. Start your swing with both feet placed firmly on the ground, and during your swing raise your left heel so as to enable the body to be bent backwards. As your racket begins to come forward, lower the left heel and raise the right, lifting the right foot off the ground altogether as the ball is struck, and swinging it forward as your body comes round. Remember, however, that it is a foot fault if the right foot crosses the base line before the ball is struck, so do not get into this habit. You must also stand behind the base line, so always be careful where you place your feet before starting to serve. Watch the ball all the time, and hold the racket tightly as the ball is struck.

After you have learnt to get your service into court, you should then practise getting it into a particular portion of that court—in other words, to place it where you want it. A good idea when prac-

tising is to get a box or tin and put it somewhere in the court into which you are going to serve and try to hit it. You will find it extremely difficult at first, but you must persevere. Good players are able to place the ball within a few inches of the desired spot practically every time. Learn to vary the angle and the length of service. A good length serve is one that pitches within a foot or so of the service line, and generally speaking this is desirable. When, however, you make a serve at a very acute angle, it is often useful to be able to pitch it about half-way between the net and the service line. Such a service forces your opponent right out of the court to take it, and often gives you the opportunity of making a winner from his return, before he gets back into position. Learn to vary the speed of your service; even though you successfully cultivate a fast one, your opponent will get accustomed to it, unless you send him over a few slow ones mixed up with the others. In the service which I have described, the ball should be hit with the face of the racket flat, that is, at right angles to the direction of the flight. There are numerous varieties of service, but I think beginners will be well advised to learn a flat service first, before going in for variations.

Singles Play.

In describing the various basic types of shot, I have continually stressed the need for practice. You can practise serving by yourself and also by hitting the ball against a wall, but there is no better way, generally speaking, of obtaining practice than by playing singles against someone slightly better than yourself. It is always nice to win, and you should cultivate a determination to do so, if you want to become a good player. On the other hand, in the early stages it is more important to perfect your shots, and winning the game should be a secondary consideration. Nothing is more pleasant than to play regularly with someone who is not quite so good as yourself, and to beat him continually. This policy, however, will be found to be very detrimental, because when you do come up against better players you will think that your game is much better than it really is, with the result that you have a sad awakening. It is much better for boys who are learning the game to play singles to start with, as they get more practice, and are likely to have longer rallies than in doubles. Tactics play just as big a part as

strokes in winning a match, and the ability to find out your opponent's weaknesses and profit by them may enable you to beat a man who in some respects is a better player than yourself. All these things can be learnt by playing singles against different types of people, and particularly, as I have said, against rather better players.

The return of service is a very important shot, and you should learn to hit it into the court in the great majority of cases. Against an opponent who has a good service, the return may normally be a defensive shot, but need not necessarily be a weak one. A most important point is to make your return a good length shot, that is, one that pitches within a yard of the base line. Good length is always important in singles, but particularly in the case of the return of service. You will appreciate that the nearer to the net your return pitches, the more command of angle it gives your opponent, and also enables him to come in to the net to volley. You can often make an attacking shot of your opponent's second service, but do not do this if you find you are making a lot of outright losers. Get the ball into play, so as to give your opponent an opportunity of losing the point. There is no need for every point that you win to be gained by means of an outright winner. Just as many points can be won by forcing your opponent to make a loser, by accurate placing, superior speed, or by playing to his weaknesses. The easiest type of return of service is one that goes diagonally across the court to the far corner. This is, of course, more or less back to the point from which your opponent has served. You should also learn the shot straight down the line to the other corner of the court. This requires particular care over footwork, because it is easier to hit the ball back in the direction from which it has come than to change the angle of flight. Vary these good length returns with short shots across the court, pitching round about the service line. These latter will be no good, however, unless they are considerably angled and kept fairly low.

Few players can attain the ideal of having all their shots equally good, though it is, of course, desirable to aim at this. We naturally all have our strong shots and those that are not so strong. The average player will do well if he can avoid having a positive weakness. Supposing, then, that your strongest shot is your forehand drive; you should, during a match, try to make your winning shots with your forehand and avoid trying to make winning strokes

with your weaker shots, as the result is likely to be a high percentage of losers. Keep the ball going with your weaker shots, such as the backhand, and try to manœuvre so that you can force your opponent to send the ball to your forehand, off which you can then make a winner. Reversing this idea, you should, early in the match, find out which are your opponent's strong shots and which his weaknesses, to try to make him use his weaker shots as far as you can. (Avoid overdoing it, however, because many players who have a rather weak stroke have a nasty knack of bringing off some surprisingly good shots with it, if they get enough practice at it in a match.) Variety again is one of the most important things. You must vary your own shots in length and in direction, so that your opponent has a variety of different types of shot to play, and cannot settle down to a steady rhythm on any particular shot.

Many players whose backhand is weak get into the habit of running round it and taking the shot forehand. This is all right up to a point, but if overdone, particularly against a clever player, it enables him to force them farther and farther into the backhand corner, thereby leaving the court quite open on the forehand side, so that he can make an easy winner there. Boys should certainly not avoid their weak shots in this way, because if they do they will never improve. They should, as I have said before, concentrate on practising all their shots, with a view to making them all, as far as possible, of equal standard.

Never stand still after making a shot, but always move back towards your base. This is the place in the court which gives you the easiest access to all parts of the court, and from which you can move quickly in any direction. Its exact position depends on the type of game which you play, and on your opponent's game, but, generally speaking, in singles it should be a few feet behind the centre of the base line. From here you can be ready to move forward or sideways as required. Then if you have to play a shot from one of the corners of the court, come back towards your base immediately you have made the shot, so that you can be ready to go quickly up to the net, or to the other corner of the court. These remarks do not apply if you are going to the net to volley, but again, if you are at the net, and have to make a volley at the side of the court, come back towards the middle immediately, in case your opponent manages to make a return.

Contrary to the belief of many non-players, tennis is quite an

exhausting game, and a hard match takes a lot out of one. Try, therefore, to conserve your energy, but force your opponent to expend as much as possible of his; in other words, try to make him run about, not only sideways, but up and down the court as well. If he gets tired you will find it all the easier to beat him. Do not waste your energy running after shots which you cannot possibly reach, but save it so that you can bring out a little extra at critical points.

All tennis players know the "retriever". This is the man who makes few mistakes and gets everything back. Such a man is a very useful person to play against, but may prove a difficult opponent to beat. Boys who get regular practice with one of these steady players will find that their game will improve immensely. When up against such a man, however, it is fatal to try to make a winner of every shot, even though you may be tempted to do so, by reason of the slowness of your opponent's returns. At the start of a game you may be able to do so with ease, but you will usually find that your winners become less easy to make as the game goes on, and that you make an increasing proportion of losers, which is, of course, what your opponent wants. Therefore, wait your opportunity, remembering that to beat such a man you must be accurate and controlled. Many "retrievers" thrive on fast shots, but are at a loss to make a good reply to a soft shot half-way down the court, a shot which, you will remember, is normally considered very bad. Try this out, therefore, and see what sort of a reply your opponent makes. Such a shot occasionally may force him into errors, or give you the chance of making a really easy winner. Such men are often bad volleyers, and a short shot may bring them up to the net, where a fast drive may pass them, or cause them to miss a volley.

From my remarks you may think I have laid too much stress on what your opponent does, and that I intend to encourage you to suit your game to his. This is not the case. Tennis is essentially a game where individualism and initiative pay, and if you can impose your game on your opponent you have won half the battle. Nevertheless, it would be sheer foolishness to continue to play your ordinary game if you found that your opponent was thriving on it. You must obviously take advantage of his weaknesses. In other words, brainwork is a very important part of lawn tennis, and many players who have beautiful strokes do no good because they do not

use any intelligence. Others, whose strokes may seem relatively poor, do very well, because they make the most of them by playing with their brains. Experience is most important, and I recommend boys not only to play tennis, but to watch others playing, and particularly to watch good players. When watching, if you are going to learn anything from the players, you must not watch the ball all the time. It is always a source of amusement to players at Wimbledon on the Centre Court to notice the continual moving of all the spectators' heads from side to side, as they follow the flight of the ball. The spectators come to watch for pleasure, and to most of them the ball is the best thing to watch. I advise people who wish to learn, however, to watch the players and see what they do, not only before they make a shot but after. It was always a source of great instruction to me to watch Fred Perry. No one was quicker than he about the court, and by watching him one could learn better than in any other way how and where to move after making a shot, and in anticipation of the next.

This brings out one more point which is worth noting, and is bound up with what I have said before. If you can anticipate what your opponent is going to do, and make use of that anticipation by getting to the right place to make a shot, you will make that shot very much easier for yourself. This power of anticipation can only be gained by practice and by watching other players. When watching, try to think to yourself what sort of reply you would make to a shot, and then see what sort of a reply the player makes. You will see that different players make different shots in similar circumstances. Observe what other people do and what they avoid doing, and then apply the results of your observations to your game. Remember, moreover, that, as in everything else, you can only learn from your mistakes, and that it is very easy to go on making the same error over and over again without realizing it. Guard against this, so that when playing a match you do not beat yourself in this way. Tennis needs a combination of brain, eye, and body, and all three must be used if success is to be obtained.

Doubles Play.

Much of what I have said in the last section applies to doubles as well as singles. There are other factors, however, which essentially concern doubles, which I will now mention. To my mind,

the most enjoyable form of the game is men's doubles. Not only because it introduces the element of team work, which is such a desirable feature of games, but because it calls for qualities of judgment and co-operation to a greater degree than other forms of the game. It is also usually faster and more exhilarating. There is no space in this book to go into the full detail of doubles play. To do so would need almost a whole book on this subject alone. There are various important points, however, which I will mention briefly, in the hope that boys will grasp the basic principles of doubles play.

I have already mentioned the importance of the service; after this, and perhaps even more important in many respects, is the return of service. Even though you win your own service games every time, you cannot win a match unless you also win some of your opponent's service games. The return of service, therefore, plays a very large part in doubles, and is the first essential for a good doubles player. It is only too easy to lose game after game, by hitting the return of service into the net or out of court, and to delude yourself, because you make an occasional winner, that you are doing all right. This is fatal. You must ensure that the great majority of your returns go into court, so that they, at any rate, give your opponent a chance of making a mistake. Only then are you justified in going for a winner occasionally. It is better to be steady, without brilliance, if the latter involves a large proportion of losing shots. It is particularly important to make a good return when you are a point up. This usually devolves on the player in the left court, and it is therefore very important that this man, of the two partners, should be the steadier with his service return.

When you have learnt to return the service into court, you can then start to learn the variations of the shot, and you should bear in mind that variety is a very important point in all aspects of the doubles game. Briefly, the types of return are, across the court, straight down the line, and a lob, with, of course, minor variations of each of these types of shot. I am, of course, assuming that the server's partner is at the net, and right from the start in learning to play doubles you must play at the net. I would even advise boys after they have acquired a reasonably reliable service to run in to the net behind it. When you do this you must aim to get in as near to the net as possible, so as to volley the return from as commanding a position as you can reach. The essence of doubles play is attack, and the best attacking position is at the net. The players who get

nearest to the net usually win in doubles, provided, of course, that their volleying is adequate.

Another important principle of doubles play is that partners should, as far as possible, be level with each other all the time, that is, the same distance from the net. If one player is at the net and the other at the base line, the opponents have very much greater choice of position and angle for making their shots, particularly if they are both at the net. An important point to remember when volleying is to aim the ball at your opponents' feet, thus giving him a very difficult return. You can only do this if you are close to the net, and your opponent some distance from it. It is fatal for a doubles player to stay round about the service line. It is very difficult to make a good volley from this position, and hopeless if your opponent makes a good length shot, as you will not be able to get back in time to take it after it has bounced. The position also gives your opponents a wide choice of angle for their return, and enables them to hit the ball at your feet. You, on the other hand, are bound to send any return that you are able to make in an upward direction, thus giving your opponents an easy volley, if they are anywhere near the net. You must either be up at the net or at the back of the court. The half-way position is fatal.

Once again I want to stress the need for team work and co-operation between partners in a double. You will get no fun out of the game unless you are in close accord with your partner, neither will you do any good. There is no point in continuing to play with someone with whom you do not agree. You will both do better to realize that you do not get on well, and to choose other partners. Some people get on each other's nerves, and the best thing for such people is to part. It is very rare for really good singles players also to excel in doubles. The two forms of the game call for different qualities, and a man has to be exceptional to combine them both. I advise boys, however, to play both singles and doubles, so that they may learn all the aspects of the game. Later on, they may specialize in one or the other if they wish.

Types of Court.

The principal types of court available for play in this country are grass and hard courts. The former, of course, are only usable in the summer, and unless they are well kept tend to become very bumpy. A good grass court is, I think, the best surface on which

the game can be played. Hard courts are of various types. Such surfaces as asphalt or concrete are true enough but very tiring on which to play, as they are hard on the feet and also give a higher bounce to the ball than is obtained on any other type of court. The most usual type is rubble. Such courts need a considerable amount of upkeep, but can be played on all the year round except in frosty weather. The principal thing to remember about hard courts is that they are considerably slower than grass courts. The ball on pitching is checked slightly by the loose surface, and rises more vertically than it does on grass. It is most important to remember this when changing from one type of court to the other. To get into the right position to make your shot on a hard court, you must move in a little nearer to the net, to allow for the type of bounce. This check on bouncing, of course, takes away a considerable amount of speed from a shot, and thereby gives an advantage to the player who relies on defence rather than attack. If you are an attacking player you will prefer grass courts. I myself was always very much better on grass courts for this reason, and would often lose matches on hard courts to the retrieving type of player, whom I could easily beat on grass, where my hard hitting reaped its full reward. Patience is important on hard courts. You must wait for your opening and be prepared for long rallies and out-manœuvre your opponent before trying to make a winner. On grass courts you may be able to make a winner very much sooner by relying on speed.

Match Play.

It is important for boys to remember that for most young players it is very much easier to play well when you are in a losing position, particularly when you are against an older man. You feel that you have everything to gain and nothing to lose, and often achieve a brilliant recovery from a bad position in a match by going out for shots almost in desperation. A much more difficult thing for young players is to consolidate a winning position. It is very easy to get slack and to feel that you have won a match, only to find that your opponent begins to win without your realizing your danger, so that you often lose a match you should have easily won. Remember that no match is won until the last point has been scored, and that it needs great determination to go on playing well even though you are winning easily.

Tennis players still discuss the famous final at Wimbledon between Tilden and Cochet, when the former was two sets up and 5–1 in the third. For some reason that has never been satisfactorily resolved, he failed to win this match, his game getting worse and worse as Cochet's got better. Many people think that it was because he thought he could win whenever he liked, and wanted to give the spectators a good game. If this was the case, he certainly regretted it. This match also brings out another thing, that is, no match is *lost* until the last point has been scored. You can often win from an apparently hopeless position. Never give up, therefore, until you are really beaten.

Finally, I want to say a word about sportsmanship. Remember that the manner in which you play is more important than the result. Unfortunately the game has been marred in the past by the behaviour of some of the best players. It is a pity that such a wonderful game should gain a bad reputation in this way, and I hope all my readers will be determined to avoid such conduct. Never show your feelings, whether you win or lose, and above all, refrain from throwing your racket about or indulging in other such unsportsmanlike behaviour. All tennis players should bear in mind the words of Kipling, which are inscribed over the players' entrance to the Centre Court at Wimbledon:

> "If you can meet with triumph and disaster
> And treat those two impostors just the same."

MOTORING AND MOTOR CYCLING

The ambition to be a locomotive driver is not so general among the youth of this generation as of the last. To pilot a fast plane seems more attractive to-day, but to drive locomotives or to pilot jet-propelled planes is not for the majority. Happily, the last half-century has provided a practical alternative in the motor vehicle, which from a curiosity at the beginning of the century has become a means of personal transport and a source of pleasure to millions.

Not the least factor in this amazing development is the attraction of possessing, handling and looking after one's own vehicle. The keen cyclist knows it, and the motorist also, while perhaps the motor cyclist feels it more keenly than either. The rider of a motor cycle is more in sympathy with his mount, which is controlled by balance as well as by hands and feet, than the driver of a car can ever be.

True, he is more exposed to the weather, but that also gives him a feeling of exhilaration, a sensation more akin to that of flight than even the aeroplane itself, which normally gives pilot or passenger little sensation of speed, and none of the thrills of swooping up a hill or taking a corner safely and skilfully at speed.

Older folk are apt to regard the motor cycle as noisy and dangerous, but that is a fallacy due to disappear with modern machines, which are quiet and easy to handle. The most staid family car can be driven dangerously and even noisily, and the motor cycle is preferable in many points to the cheap second-hand small car which has to some extent supplanted it.

In the future the motor cycle promises to enjoy a new popularity as the cheapest form of individual travel, and with a side-car the cheapest and simplest vehicle for two.

There is, moreover, no better introduction to motoring, and the education in road sense, begun with the bicycle, can be perfected on the motor cycle, and the roads to-day would be safer if all drivers had experience of the single-track machine.

To become a motor cyclist is simple enough. The dealer who sells the machine will do what is necessary as regards registration and

insurance too if required. It is necessary when licensing the machine to prove that insurance against third-party risks has been taken out. If the policy is not completed, the insurance company will provide what is known as a cover note which will be accepted by the licensing authority. Tax varies with the size of the engine, but is moderate, while a driving licence costs but 5*s*. a year.

Running costs are low with a motor cycle. A little petrol and oil literally go a long way. Tyres are not expensive in motor-cycle sizes, and they have a good life under normal conditions of use, but will wear rapidly—more especially the rear tyre—if fierce acceleration and braking are indulged in.

Maintenance costs will depend upon how much the owner is prepared to do himself. If he is mechanically minded, studies the instruction book, and uses his intelligence, there is little call for the services of the repair shop until the time comes for overhaul.

The novice is advised to join a club. There is bound to be at least one in his locality. In company with other enthusiasts he will learn much more about his machine and its handling, while he will have an opportunity of taking some part in the sporting side, either as an official or a competitor in club events.

Early difficulties and lack of experience will be the easier surmounted with the aid and advice of the older hands at the game.

But do not seek to emulate them too soon. Anybody can ride fast, but to ride fast and retain perfect control needs practice.

When the new machine is delivered study the controls; do not be in too much of a hurry to take it on the road. Put it on the stand and start the engine. Then try the controls and, sitting on the machine, get the feel of them, so that on the road the hands will operate clutch and throttle and the foot find the brake automatically.

Beware of running the engine in a closed or confined space, however, for the exhaust fumes are dangerous.

In starting, do not overflood the carburettor. If an over-rich mixture refuses to respond to the kick starter, open both throttle and air levers full and turn over the engine several times.

Once started, throttle down to a steady speed and do not " race " the engine until time is given for the oil to circulate and warm up. In any case it is really seldom necessary to " race " or " rev " an engine.

To move off, the clutch lever is raised, and the gear lever moved to the first speed position. Then the clutch is let in smoothly, and

as the machine moves off a little more throttle can be given, the ignition lever fully advanced and full air given.

In changing up the gears should never be forced. Declutch and throttle down at the same time. Wait a moment, then move the gear lever, let the clutch in gently and open the throttle again.

The change into the highest gear calls for a little judgment if knocking is to be avoided. The machine should be travelling at a fair speed.

Changing down is not difficult, but to change right down from top to first needs some care. The machine should be moving at almost normal bottom-gear speed before the change is made.

Where gears are foot-controlled, operation should be gentle, as undue roughness may damage the control mechanism.

Restraint must be exercised during the first 500 miles or so with a new machine. Oil supply should be on the liberal side during this running-in period, on which much depends. Patience will be rewarded by a more efficient and longer-lived engine if all bearing surfaces are allowed to form a hard and polished skin. To some degree this applies to every moving part from hub bearings to piston.

From 30 to 35 miles on top gear and correspondingly less on the lower gears should be the maximum for this period.

On the road avoid unnecessary acceleration on the lower gears. Nothing annoys the public more. Respect the 30-m.p h. limit in built-up areas, and remember that between 11 30 p m. and 7 a.m. it is an offence to sound the horn. Give loud signals in time and always keep well to the left on corners. It is bad riding as well as dangerous to take bends so fast that it is impossible to keep to the left half of the road.

Driving licence and insurance certificate should be carried always. A speedometer is compulsory, and it is supposed to be in working order. Finally, if you want to carry a pillion passenger you must have a proper pillion seat properly fitted. A make-shift seat is not legal.

Finally, in studying your manuals and instruction books do not forget to study the Highway Code.

Choosing a Motor Cycle.

The choice of a machine must depend upon how it is to be used. The simplest type is the little 98 c.c. light-weight, which may be regarded as a link between the pedal cycle and the motor cycle.

With a clutch operated from the handle bars and a two-stroke engine, it represents the simplest type of machine.

Motor cycles are classified by the cubic capacity of their cylinders. Thus the 98 c.c. light-weight has a cylinder of 50 mm. bore and 50 mm. stroke, or piston travel. If the capacity of such a cylinder is worked out, it will be found to be just under 1000 mm. or 100 c.c.

There is a range of light-weight machines with larger engines, however, such as 125 c.c., 150 c.c., and 200 c.c., these also being two-strokes as a rule, but having a gear-box as well as a clutch. In fact two-stroke engines are made up to 500 c.c., but there are not many machines with engines of this kind over 250 c.c.

An excellent machine for the beginner who wants a real motor cycle, but not an unduly heavy one, is a good 250 c.c. model. A side-valve model is perhaps to be advised, but if a little more efficiency and speed are required, then overhead-valve models are available also. Such a machine will weigh from 200 to 224 lb., and will have a clutch and four-speed gear-box. Then another popular size is the 350 c.c. machine, which scales a little more, is definitely faster, and gives indeed all the performance which the average rider requires. It will also give good results with a side-car.

Always popular where a full-powered machine is required is the 500 c.c., which not only gives a good touring machine with or without side-car, but is an established racing type. The Senior T.T. is for machines of this size, and generally it may be said to be the recognized sports type. It also represents the largest-capacity single-cylinder engine generally made. There is a famous 600 c.c. single-cylinder machine, but this is really intended for side-car work.

Above this size two or more cylinders are used to ensure smooth running, a big single being inclined to be less flexible and the power-impulses more noticeable. A 500 c.c. machine will weigh from 300 to 350 lb.

The single-cylinder engine is generally mounted vertically in the frame, but it may be inclined or even horizontal.

Twin-cylinder engines of less than 500 c.c. are made, but many prefer the greater simplicity of the single-cylinder in the smaller sizes. There is not much choice over that capacity, however, but the big 1000 c.c. twin is a heavy machine more suitable to the experienced rider and for side-car use.

There are also four-cylinder motor cycle engines. There is one well-known model known as a "square four" from the compact arrangement of its four cylinders.

For a first machine it might be repeated that a good 250 c.c. four-stroke with four-speed gear-box is a safe recommendation. The side-valve model will do quite well, and will be found easier to maintain, for a certain amount of attention is necessary if a machine is to be maintained in good condition and to be free from trouble on the road. The stitch in time applies to the motor cycle as to all machinery. More so than perhaps to most, for in the motor cycle we have a precision mechanism subject to all the bumps and vibrations produced by speed on surfaces of all qualities and doing its work unprotected from the weather.

Running Hints.

To maintain efficiency one of the points requiring periodical attention is the clearance between valve stems and tappets. This increases with wear, and if excessive the valves will be made to open to their full extent. They must not be adjusted too closely, however, as it must be remembered that the clearance will become less as the engine heats. The adjustment should be made with a cold engine, and the exhaust requires rather more than the inlet owing to its higher temperature. The recommendation of the makers should be followed, as with some overhead valves the same clearance is recommended for both valves. Clearances should be checked about every 500 miles. If excessive, there will be noise and loss of power. If too little, there will not only be loss of power but the valves may be damaged by gas leakage during the working stroke.

The exhaust valve lifter, used to relieve compression to make starting easier, must be kept carefully adjusted to give a certain amount of back-lash to make certain that the exhaust valve can close properly. The valve lifter should never be used to control speed.

At much longer intervals it will be desirable to detach the cylinder-head to remove the carbon deposit, and if the valves show any signs of burning or pitting they should be "ground-in". Side-valve engines do not generally require decarbonizing as often as overhead-valve. About every 2000–2500 miles in one case and about 3500–4000 miles in the other is about right. Side-valves should not require attention more often than alternate decarbonizings.

In replacing a cylinder-head care should be taken to tighten down the nuts in the order recommended, to avoid any possible distortion. These nuts should be tested for tightness after a few hundred miles' running, as they tend to slacken off.

If there are any signs of clutch slip, there is an adjustment for this, while if the chain drive from engine to gear-box—known as the primary chain—stretches it can be tightened by moving back the gear-box. This should be seldom necessary, but if it is it will entail a readjustment of the gear-operating rod. The secondary chain is adjusted from the rear fork ends.

Brake adjustments are comparatively simple, and there is no excuse for their neglect. Hubs should occasionally be tested for side play, and if steering feels uncertain at any time the wheels should be tested for alignment. A string stretched from front of front wheel to rear of rear wheel should touch the tyres at four points; a board can be used for the purpose if available.

If the front spring fork is of the link type, the links must be kept free from side play. The steering head must also be kept free from shake. The steering damper should be removed to test this by pushing and pulling the front wheel with the engine packed upon a box to take the weight off the wheel.

The magneto or " magdyno " needs little attention, but once in a while the contact breaker should be examined and the clearance checked. If the contacts are kept clean and free of oil, adjustment should not be needed except at very long intervals.

There is little trouble with carburettors nowadays and once tuned, adjustment is seldom necessary unless for special requirements. Petrol and air filters should be cleaned at intervals, and also the float chamber should be examined occasionally for water or sediment which may have collected.

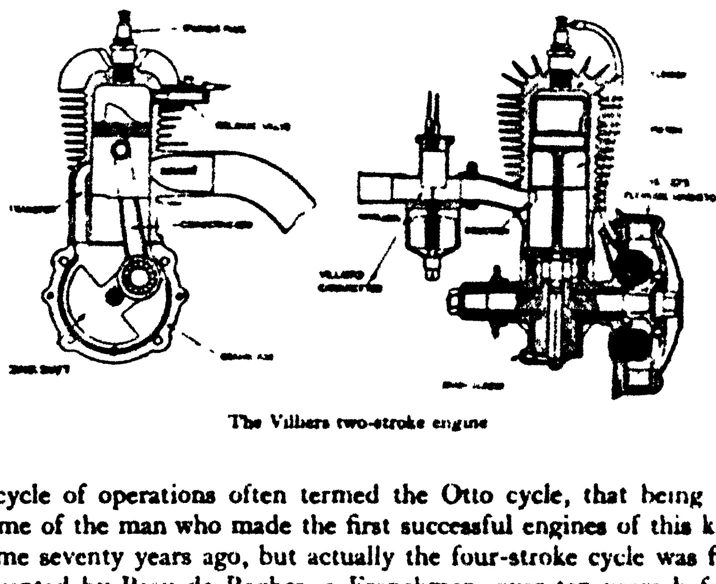
Such are the chief points in maintenance, which can only be briefly indicated. It is an excellent idea to obtain an instruction book before the machine is delivered so that its details may be familiar before it arrives. In any case, study the instructions and follow them. Trouble-free running should be the reward. But do not always be taking things apart, and when you do, remember the order in which the parts have been taken down so as to replace them correctly. Finally, attend to lubrication. Better too much oil than too little, but better still—just the right amount.

How the Engine Works.

In general principles the motor car and the motor cycle are very similar. Both have an engine, a clutch, a gear-box, and some form of transmission of power to the rear axle.

Both have a frame, steering by the front wheel or wheels, and of course brakes, and their main difference is that one has four wheels and the other two.

The engine of both car and motor cycle functions on the same principles. The usual type is known as a four-stroke, working on



The Villiers two-stroke engine

a cycle of operations often termed the Otto cycle, that being the name of the man who made the first successful engines of this kind some seventy years ago, but actually the four-stroke cycle was first invented by Beau de Rochas, a Frenchman, over ten years before.

Now most of those who read this will have some idea of how the steam engine works, and of its principal parts, while many will be familiar with the principles of the internal-combustion engine also. Thus there is no need to explain what a cylinder is or a piston, connecting rod or crank-shaft.

In the petrol engine the piston moves down the cylinder, leaving a vacuum behind it into which rushes a mixture of petrol and air admitted by the inlet valve. That is the first stroke.

As the crank-shaft turns over its bottom dead-centre the piston

rises with all valves closed, and the mixture is compressed into the top of the cylinder. This is known as the combustion space.

At or near the top an electric spark ignites the charge, which explodes, or rather burns rapidly, developing pressure which forces the piston down, the valves still being closed. This is the working stroke.

The next and upward stroke is made with the exhaust valve open, and the products of burning, or combustion, are discharged into the atmosphere.

Thus the four-stroke cycle consists of:

1. The inlet stroke. Downwards.
2. The compression stroke. Upwards.
3. The working stroke. Downwards.
4. The exhaust stroke. Upwards.

It might be thought that the result would be very uneven running, but the flywheel is heavy enough to absorb some of the power on the working stroke and to give it back on the other three.

Clearly the more cylinders the smoother the running and the lighter the flywheel can be. Also, it becomes easier to balance the up-and-down moving or reciprocating parts by means of weights on the crank-pins or flywheel.

Thus we have twin-cylinder motor cycle engines and some four-cylinder, but long ago four cylinders became the least number favoured by car designers, although there are a very few three-cylinder car engines.

Six cylinders are also popular with car users; many cars have eight cylinders, and a few have twelve.

It is the carburettor, of course, which supplies the mixture of petrol and air to the engine. The suction of the piston on the inlet stroke draws air and liquid petrol through the carburettor, the latter through a fine jet which turns it into spray which, mixing with the air, is a vapour as it enters the engine.

The electric spark is provided by a battery and coil or a magneto, which is really a simple dynamo with a coil. The spark has to be timed, of course, to ignite the charge at the right moment and the distributor and contact-breaker look after this.

There are also the valves to be opened and closed. Now the spark, the inlet valve and the exhaust valve are only working once each during the four strokes or two revolutions of the flywheel. Thus

they are operated at half the speed of the crank-shaft or flywheel, from a shaft driven by half-speed gearing known as the cam-shaft because it has eccentrically formed discs or cams on it to open the valves.

This cam-shaft may be mounted beside the crank-shaft operating valves mounted at the side of the cylinder, or they may operate valves set upside down in the head and opened by rockers. The first are side valves or " S.V.", and the second overhead valves or " O.H.V.". High-efficiency engines, however, often have the cam-shaft overhead as well, and in some modern engines the cams press down the valves directly without any rockers interposed.

That, very briefly and roughly, is how the internal-combustion engine of the four-stroke type works.

Perhaps someone may ask why " internal-combustion " engine? Well, the steam engine is an external-combustion engine, where the heat is applied externally to a boiler to generate steam which provides the working medium.

In the petrol engine, however, the fuel is burnt in the engine itself, and the working medium is the heated gases under pressure.

Now the four-stroke is not the only kind of petrol engine. There is also the two-stroke, not much used for cars, but widely used for light-weight motor cycles. It is a simple engine as it has no valves and consists merely of three moving parts, piston, connecting rod and crank-shaft.

In the place of valves there are ports or openings in the cylinder walls which are uncovered by the piston as it moves up and down. If we assume the piston to be at the bottom of its stroke and starting its ascent, it uncovers the inlet port from the carburettor and creates suction in the air-tight crank-case.

The mixture thus first enters the crank-case, but above the rising piston the waste gases from the last explosion have been driven out by the exhaust port and a charge is being compressed.

At the top of the stroke ignition occurs, forcing down the piston and compressing the gases in the crank-case from which it is admitted to the cylinder by a transfer port.

It will be seen that above the piston, fresh mixture is being admitted at one side while the waste gases from the previous explosion are being pushed out on the other. This is made possible by shaping the top of the piston so that it acts as a deflector, and the new gases help to expel the old. There is apt to be some mixing,

however, and although, as its name suggests, the two-stroke engine provides a working stroke for every revolution in place of every two as in the case of the four-stroke engine, it does not develop anything like twice the same power for the same size of engine.

It is, however, an extremely simple engine and also a quiet one, as there are no valves and operating mechanism to cause noise or need adjustment.

Both the four- and two-stroke types of engine are "reciprocating" engines like the usual type of steam engine. That is, the up-and-down motion of the piston is converted into rotary motion at the crank-shaft, the change being effected by the connecting-rod and crank. Naturally, there have been attempts to eliminate this complication of reciprocating parts, and hence the steam turbine, where the steam acts directly on the turbine blades like water on a water-wheel.

Equally naturally, efforts have been made to do the same with the internal-combustion engine, but the main difficulty has been to obtain materials able to resist the continuous high temperatures. Gas turbines driving dynamos and locomotives have been in limited use for quite a while, but more recently smaller units have been perfected and they have made possible the jet-propelled plane.

The subject is mentioned briefly here because there is a common idea that jet propulsion might be applied to cars and motor cycles. A famous German designer has planned a car so propelled for attacking the world's land speed record.

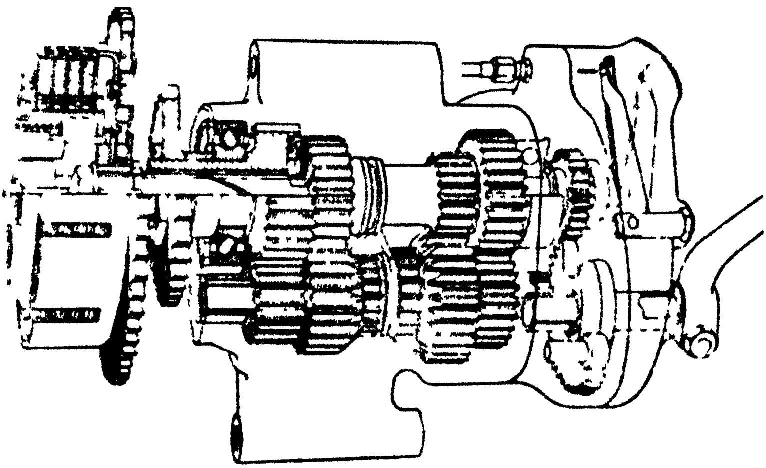
This might be practicable and is certainly an attractive idea, because no transmission system is required, and wheels and tyres have only to roll and not to transmit the power. Moreover, the hot blast of the expelled gases would not be objectionable on Daytona Beach or Utah Salt Lake, but they certainly would be on the public highway. The fact that the Germans had jet-planes in use, it may be remembered, was first discovered by marks on the grass of a German air-field shown in an air photograph and duly identified as marks of scorching.

Thus for practical purposes we can dismiss any alternative to the present types of petrol engine, although that is not to say they will not be greatly improved.

Types of Gears and Transmission.

So much for engines. After the engine comes the clutch, which, as its name suggests, connects the engine with the transmission. It can be of various types, but its usual operation is by foot on a car and by hand or foot on a motor cycle.

It can be operated automatically so that it only grips when the engine reaches a certain speed.



The internal arrangement of a typical four-speed gear-box with clutch and kick starter pedal

(By courtesy of Messrs Burman & Sons, Ltd.)

Next comes the gear-box. To explain its method of working without entering into a lesson in mechanics, a comparison might be made with a winch by which a man can lift a weight much greater than he could with his own hands.

This mechanical advantage is obtained by a small gear-wheel turned by handle engaging a larger gear-wheel. The smaller the first wheel and the larger the second, the heavier will be the load that can be lifted, but it will be lifted proportionately more slowly. The gear-box on car or motor cycle encloses two or three such pairs of gears and also means of connecting the engine directly to the final transmission.

The gears are changed by hand on a car and by hand or foot on a motor cycle. From the gear-box to the rear axle of a car the drive is by a shaft, but shaft drive is not so commonly used on motor cycles. The usual arrangement is by chain from engine to gear-box and by another chain to the rear wheel. An alternative is by gears from engine to gear-box and by chain to the rear wheel.

Cars have three or four speeds or sets of gears, but it is generally only light-weight motor cycles which have three speeds, the greater number having four. Some motor-cycle manufacturers make their own gear-boxes, but most machines are fitted with one out of a comparatively few boxes made by makers specializing in their production, which makes repair and replacement correspondingly easier.

Both cars and motor cycles must have frames to carry engine and transmission, in addition to their passengers or passenger.

The motor-cycle frame, like the bicycle frame, is a vertically stiff structure, but with the pull of a powerful engine it must also be stiff laterally, else it will twist or whip and make the machine erratic in its steering and more likely to skid on treacherous surfaces.

Important to ensure this lateral rigidity is that there should be no side-play in hubs or in the front steering forks, where wear of the spring links may permit side-play

This possibility of side-play is one reason why the fully-sprung motor cycle is still comparatively uncommon. It is a desirable development, but adds complication and weight as well as introducing bearing surfaces liable to wear. There is no doubt of the greater comfort provided by a frame sprung at the rear as well as the front, and the use of it may be expected to become more general on all but sports types of machine.

The Competition Machine.

While routine maintenance will keep a machine in efficient running order, something more is necessary if competition work is contemplated. This tuning will vary to some extent according to the class of event the motor cyclist has in mind. Thus not the same preparation of a machine is required for a reliability trial as for a hill-climb or again for track racing. The last-mentioned class of sport is, however, for the expert, and we need not say much about it here.

For trials work a super-tuned engine is not necessary. The principal thing is to make certain that every detail is in good con-

dition and in proper adjustment. It is better that decarbonization, valve grinding and tappet adjustment be done a little while before the trial, so that all parts have settled down to their work and a final check of all nuts, bolts and fittings can be made before the day of the event.

Weatherproofing of the ignition system is important, as deep mud and water splashes may be part of the fun on a trials course. If a plain petrol pipe is used, it can be wound with insulating tape as a protection against fracture from vibration.

Tyres, of course, should be in good condition and correctly inflated, and if competition tyres are not used the treads should not be worn, but should have a sharply defined pattern to give good holding on loose surfaces. The competition cover with its bold cross moulding gives maximum road grip, but is not comfortable for main road riding and is not very effective as an anti-skid. Note the covers of a speedway mount. The treads give a good drive grip to ensure maximum acceleration without wheel-spin, but they do not resist sliding at the corners.

For hill-climbing the problem is different. The preparation will be with a special job in view, and the keen competitor studies the hill, its gradients and bends, so that he may decide what gears to use and when, and whether the whole range should be raised or lowered by changing chain sprockets.

Otherwise tuning is a matter of getting all the mixture possible into the engine and the exhaust gases out; also to reduce friction throughout the machine to a minimum, and this not only applies to the engine but to every part of the machine.

Wheels must be free, but without shake, and should run true. To balance them is not necessary, however, except for really high-speed work. The alignment of wheels should be checked, but if steering is not quite what it should be, and is not traceable to the rear chain adjusters, then it may be advisable to strip the frame so that the alignment of front forks, rear fork ends and frame can be definitely checked. This, however, is a task not to be recommended to the non-expert, to whom even the stripping of the machine might seem a considerable task.

If the enthusiast really wants to get the most out of his machine, he must be prepared to learn how to take it to pieces, and must be familiar with the inside of his engine. The expert strips his machine when new, but if a lesser standard of efficiency is required, the

stripping can be done some time after running-in has been completed.

Increasing the compression is the easiest way of getting a little more kick out of an engine. Machining the base of the cylinder is one method, but that is not to be recommended with most overhead cam-shaft engines or with two-strokes. It is better to use a high-compression piston, and in deciding what compression ratio is possible the makers should be consulted. Special fuels, such as high octane spirit, benzole and petrol mixtures, alcohol fuels, &c., will take ratios up to 1 in 9 for the last-mentioned, and even higher ratios are used with dirt-track machines and their special and expensive fuel.

If an engine has seen some running, there may be a slight ridge formed near the top of the cylinder, and with a piston travelling farther up the bore this will have to be lapped out. In any case, there is likely to be a ring of carbon, but this should not be scraped off, but rather removed with a warm solution of caustic soda which, by the way, should be kept away from aluminium as well as from the hands. Most convenient is a domed top piston, but it is necessary to make certain that there is ample clearance between piston crown and overhead valves when open.

Cylinder head and valve ports should be cleaned and polished, removing all roughness in the latter, so that the easiest possible flow of gases is assured.

If the crank-case is taken down, the flywheels should be taken apart and polished—not merely their rims, but also their faces—to reduce oil-drag to a minimum.

Worn tappets or guides should be replaced, and while these must be free, they must be without side-play. Air leakage can occur at a worn valve guide, but no point throughout the engine is too insignificant to consider when it is a matter of eliminating every source of unnecessary friction.

Finally, there is timing. Many makers supply special cams for high performance, but in any case after altering compression, &c., it is usual to make some experiments in slightly varying the valve timing. To vary the ignition timing is simple, but in shifting the timing pinions the timing marks should be noted, or if there are none, marks should be made so that the original timing can be returned to if necessary.

Just to fit a high-compression piston is not enough. It needs

some running in before speed is indulged in. After a speed burst the expert drains off the oil while still warm, removes the cylinder and examines the piston for high spots. These will be polished bright and will be taken down by a very fine small file. Then on goes the cylinder again, and this may be repeated several times, the piston ring gaps always being checked to make certain they do not close when the piston is inserted.

The carburettor will receive attention, different combinations of jets and chokes being tried, but always try one thing at a time, else the would-be tuner will become confused. Also he should always be certain he can return to the starting-point in his experiments.

Such are only some of the main points in tuning for high efficiency. The whole business would require a book in itself, but the enthusiast will learn most by watching or working with older hands. There lies one of the advantages of club life.

There is always somebody able and willing to give advice to the novice, and the older sportsman knows the need to encourage recruits if one of the finest of open-air sports is to continue and develop.

THE YOUNG NATURALIST

COLLECTING AND PRESERVING SPECIMENS

Most of us are collectors at heart. It may be foreign stamps, old coins, models of wooden ships, picture postcards, or even the humble cigarette picture; but we cleave to things of beauty, whether they are valuable or not. The lover of nature finds much pleasure in collecting and preserving such flowers, birds' eggs, butterflies, or perhaps seaweeds, shells, and similar objects as he comes across during his rambles. Of course, he has a second motive in this, the desire to learn more about them; mere aimless collecting for its own sake leads nowhere. The field naturalist will soon learn that he must have available a good working collection of the animals or plants in which he is interested; and these notes are intended to help him, both in collecting his treasures and in their preservation afterwards.

There are three things which every naturalist, young or old, must possess, and without which he might as well stay at home. The first is a pair of keen eyes, coupled with a large bump of inquisitiveness. The second is patience, willingness to stay silent in a ditch or covert for an hour if need be, watching the birds and animals which are just as closely watching him. The third comprises a notebook and a copying-ink pencil, with which to record *on the spot* all that he observes and collects. Captain Cuttle's dictum, "When found make a note of", should be engraven on the naturalist's heart. As to the patience requisite, although it is quite good fun to charge through bracken or climb up trees, such methods only frighten away all wild things; if you want to observe these properly you must merge yourself, as it were, into the scenery, so that they take you for granted; and in this way you may learn much which is a mystery to-day even to experts, especially concerning birds.

Certain obvious accessories suggest themselves: a haversack or some other means of carrying one's impedimenta, boxes for insects, jars for live or wet specimens, plenty of pocket room, nets for flying

things, a few paper bags, a sharp penknife, a pair of tweezers and some string. Above all, you will require a magnifying glass; one marked " ×10 " will do for most purposes, or a triplet magnifier is quite efficient. With a little ingenuity all these things can be packed up so as to take very little room. Thus equipped, let us sally forth into the woods and along the seashore.

Insects.

Suppose we start with that wonderful insect world, the knowledge of which means so much to farmers, gardeners, and even to doctors. There are many thousands of different kinds of insects in this country. Many of them are quite unsuited to exhibition, and others so minute that they will probably escape notice. It is likely, I imagine, that you will be attracted first to the showy butterflies, then to moths, and possibly also to beetles; but the less attractive members of the winged tribe—the bees, ants, wasps, the various kinds of flies, wood-lice, and the tiny crawling things which scurry away when one disturbs the bark of a decayed tree—should not be overlooked. Many insects are directly harmful to man, by causing disease in food plants, and an enormous amount still has to be discovered about their life-histories.

The butterfly hunter must be armed with two kinds of nets. For the more active species a butterfly net about ten inches in diameter and two feet long, made of mosquito netting, and fastened on a circular wire frame, will suffice; many kinds are available, but one which can be taken off the stick for easy transport is most desirable. A stronger net will also be needed for sweeping along the surface of unmown meadows, ditches and wayside grass verges.

There are about sixty kinds of British butterflies, some of which may be caught in any month from April to October; occasionally one may be seen lazily winging its course through a sheltered garden earlier or later, or even dozing on a sunny wall in January or November. Some of our butterflies are very rare, and as there are usually several broods in a year it preserves the species if you do not attempt to catch rare kinds early in the season; in any event, numbers do not compensate for variety, unless it be the common white Cabbage Butterfly, of which the more you catch the better for everybody. The best place to search for butterflies is in some sunny glade or path beside a wood. The various species have different habits, sipping the nectar of particular plants (plants upon which, a few

weeks later, you may find their eggs or brilliantly coloured caterpillars). If, therefore, you see a Red Admiral hovering among a patch of stinging nettles, and at first fail to catch it, do not waste a lot of energy by wildly chasing it; if left alone, there is a fair chance of its returning to the same spot. Some butterflies love the wild hedgerows and grassy verges of our country lanes, visiting vetches and nettles in particular; others (especially some of the beautiful small blues and fritillaries) may be found sailing over open heaths and coarse grassland near the sea, or beside rivulets or ponds, especially on chalkland. The Common Meadow Brown, one of our most familiar species, may be found in almost any field where the herbage is long, throughout the summer. The Cabbage Butterfly haunts market gardens and allotments; it lays its eggs there, and the resultant caterpillars cause an immense amount of destruction. The handsome Purple Emperor frequents willows, poplars and oak trees. Wall butterflies may often be detected asleep on some old brickwork. If you keep your eyes open, you will find more butterflies during a morning's walk in May or June than you had believed possible; but do not kill for the sake of killing. Remember that other people take pleasure in them too.

Butterflies love the light. Most moths, on the other hand, dislike it, although many of them are attracted to lights by a sort of fatal curiosity. There are twelve times as many species of moths as butterflies in Britain, besides hundreds of minute forms which to the untrained eye all look alike (clothes moths and similar small species). Most moths wear sombre brown dress, shot with fawn or pale gold, but the under wings are often brilliantly coloured; a few species, such as the familiar Tiger Moths of our gardens, with their patches of chocolate and white, or the red kinds, or the Hawk Moths, are decidedly handsome. A few moths fly boldly by day, others may be captured during the day on the shady side of fences, walls or trees, or even on the ground or in rooms, asleep. The Old Lady brown moth is often found among the folds of window curtains or resting upon the window ledges. Lappet Moths frequent apple trees and hawthorns, whereas the Oak Eggar haunts hedgerows, heathery tracts, and sand dunes; the hairy caterpillars of both these types are to be handled cautiously, as they can sting. The wild honeysuckle has a strong fascination for several species of Hawk Moths. You can often catch moths at night by hanging up an electric bulb in a dark part of your garden. Many also fall victim to the familiar

trick of "sugaring" a fence or a tree trunk. A mixture of beer and molasses or Demerara sugar is painted on the wood with an old paint brush, and the spot then visited regularly, for preference an hour or two after dusk. The results, though good in the aggregate, are apt to be speculative at times, and on some nights the catch may be *nil*. As small moths are very readily damaged, and cannot be handled easily, they should be caught on the end of a camel-hair brush that has been dipped in benzine; they should then be pinned to a cork pad in a collecting box immediately.

Having caught some insects, the next step is to kill them quickly and painlessly, without damaging their appearance too much. You should carry one or two wide-mouthed jars with tight corks (not glass stoppers) (fig. 1). You may not be permitted the use of the professional's type of killing-bottle, which contains cyanide of potassium—a deadly poison. If, however, you place in the bottom of the jar a layer of crushed and broken laurel leaves, on which a few drops of benzine have been poured, this will do equally well, although it kills more slowly. A small disc of gauze or paper loosely resting above the leaves makes it easier to pick out the specimen when dead. Failing laurel leaves, a piece of flannel on which benzine has been sprinkled (not soaked in benzine) is just as effective, the vapour stupefying the insect and eventually killing it. Ether and chloroform are used in the same way by adults. Do not put too many specimens in one jar; but if you are cramped for storage space, tear up some strips of paper and put them in first, a device which helps to keep insects' legs from getting entangled in one another.

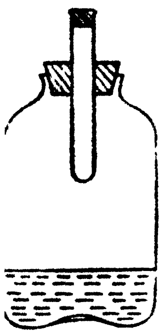


Fig 1
Killing-bottle

You will find yourself compelled to handle most of your captures. Accustom yourself to the use of tweezers; after ruining a few specimens you will find it the best way, but if you must use fingers, hold the butterfly or moth by the extreme upper edge of the wing, close to the body, and take care not to brush off too many of the scales, for these it is which give the insect its beautiful colours.

The dead specimens should be transferred to collecting boxes. An ordinary cardboard cigarette box will do. It should be lined with wadding; cotton-wool can also be used, but its threads stick to the spiny parts of the insects and take a lot of removing after-

wards. Lay your captures upon the lining, keeping them well apart, and noting in your pocket-book their order, appearance, and the details of the place and date of capture as you do so; then add a second layer of wadding, and above that more insects, and so on until the box is filled. Avoid any unnecessary pressure. Moisten the lid of the box before you go out, using a few drops of benzine and carbolic; this keeps pests away, a precaution that is always necessary. As stated above, small moths should always be pinned to a cork lining in your collecting box at the time of capture.

As soon as possible after returning home, and before the insects have hardened, they should be "set" in the conventional manner,

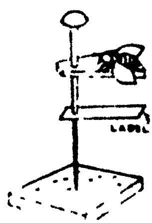


Fig. 2.—Small insect fixed on cardboard slip



Fig. 3.—Setting board

i.e. by pinning them on to cork at a uniform height above the bottom of the box, and with all four wings expanded. To do this properly requires some patience and skill, but you will soon master it. If the insects have stiffened, they will relax if some damp blotting paper is placed inside the lid of the box, and the lid then closed for a few hours. For setting you will require a supply of special entomological pins—you can get these at any natural-history shop—and a setting board (fig. 3). The board should be about 12 in. long, 3 or 4 in. wide, and 1 in. thick. It should have a groove down the middle ⅜ in. wide and ⅜ in. deep, which should be lined with a strip of cork ⅛ in. thick, thus giving a net depression of ¼ in. The insect's body rests in this, the wings lying on the surface of the board. The wings are next carefully opened with a needle and then held in position against pins, which must *not* be thrust through them; meanwhile the insect is firmly held down by a pin passing through its thorax into the cork in the groove. Some people keep the wings in position by pasting strips of gummed paper across them, but this requires care in order not to rub off the scales. When the board is filled it should be hung

up in a dry place, out of the sun, and forgotten for a few days, when the hardened insects can be removed to your cabinet or storage boxes. When permanently mounted, each insect should have a label stating its name, when and where caught, adding (if possible) a word or two, such as "on a wall", "on an oak leaf", &c. You can make suitable labels yourselves by cutting up a sheet of gummed white paper, procurable at any stationer's. It adds to the interest of one's collection if a specimen in the natural state is displayed alongside one that is artificially "set", and also if the caterpillar and pupa or chrysalis of the species are added. For preserving caterpillars, see below.

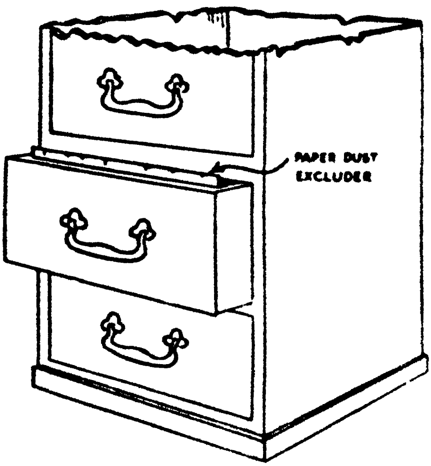
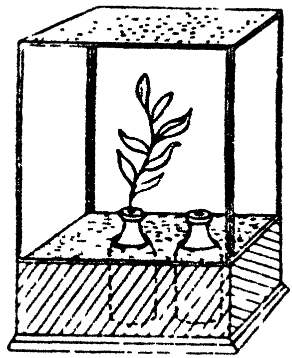


Fig. 4

Expensive cabinets are quite unnecessary. One can make one's own from old showcase drawers of moderate size, or even from open drawers, by nailing or gluing four thin strips of wood round the inside, upon which the glass top may rest. The author of these notes keeps many specimens so displayed, or even in tins, in larger drawers; and to keep out dust he pastes a strip of paper against the inner edge of the large drawer (see fig. 4), so that when the drawer shuts the paper must turn forward and close the slit through which most of the dust finds its way into drawers. In every box or showcase he puts a little powdered naphthalene in one corner, and some in the large storage drawer too. His collection has never been attacked by insect pests, although many of the items are more than twenty years old.

The best specimens of butterflies or moths are usually obtained by rearing them in breeding cages, a method which has the advantage that one learns the life-history of the insect. The eggs, which are of distinctive and sometimes beautiful shapes, are laid as a rule on a particular kind of plant, e.g. the leaves of a vetch, a willow, or a nettle. By transferring a twig with leaves and eggs complete to the

cage, and sticking its end in a bottle of water, you may keep it alive till the caterpillar emerges and begins to feed; a fresh supply of the leaves to which it is accustomed must then be provided (fig. 5). You will now enjoy the privilege of observing how a caterpillar, as it grows, is compelled to shed its coat. Eventually it passes to a resting or pupa stage, when, shrivelled up, seemingly immovable and often concealed in a cottony cocoon, it passes through the transition into the full-grown insect or imago; this stage may last a matter of weeks, or it may take an entire winter, depending on the species. You will be well advised to buy or borrow one of the various books which deal with rearing insects, so that you may thoroughly understand what species you are collecting and how to go about it; such a book is W. J. Stokoe's *Caterpillars of the British Butterflies.*


Fig. 5.—Breeding cage

To preserve caterpillars as museum specimens, although a somewhat messy job, becomes quite easy after a little practice. To kill the caterpillar, drop it into methylated spirit, but do not leave it there or it will lose its colours and shrink, for the spirit absorbs water greedily. Benzine will do equally well. Lay the dead caterpillar on a sheet of blotting paper, press lightly on it so that the rear end is pushed out, then cut this end very slightly. Next, run a round pencil over the caterpillar from the head end backwards, so as to press out the juices, but take care not to use much force, or you will damage it irreparably. Most of the green watery stuff being expelled in this way, you now take a straw or a piece of fine glass tubing that has been drawn to a point, and insert the point at the cut end; using a rubber syringe from an old scent spray, blow the caterpillar out. The specimen should then be warmed for a few moments, preferably in an oven, and then mounted, if possible, alongside a specimen of the full-grown species to which it belongs.

Beetles, though much disliked by parents as a rule, are really objects of much interest; apart from bees and wasps, they are perhaps man's best friends in the insect world, being wholesale scavengers. They display not only a wonderful variety of shapes and modes of living, but also a range of brilliant colours which must be

seen to be believed. The secret of beetle hunting is to be not too nice where one looks, and always to remember that beetles *hide*. Therefore, turn over stones and fallen branches, especially in woods; look under the rotting bark of some decayed tree; shake out on a sheet of paper or a white cloth some of the moss litter, empty beech-nuts, and whatnot which is always lying between the roots of trees; look under the shadow of walls, or in ditches; even in drains and among manure heaps you will find beetles. In addition, of course, there are numerous water beetles, which have to be fished for with a fine-meshed net. Some beetles can bite one, but the majority of those that you are likely to come across are quite harmless to you. They are best seized with the tweezers and dropped into methylated spirit or (if it be available) boiling water; but they must not be left in the spirit long. Benzine vapour kills them, but some species have great vitality. For preservation, the larger kinds may be mounted with pins driven through the wing case, or neatly stuck on to cards by their legs. A convenient killing-bottle for beetles is a wide-mouthed jar, closed by a cork through the middle of which a corked piece of glass tubing extends (fig. 1); one then has only to take out the smaller cork and drop the unhappy insect into the death chamber.

Spiders.

Spiders, which are not insects, are another very interesting subject well worth studying. The garden species have a regular habit of dropping to the ground and feigning death if attacked, and in that state can quickly be dropped into a killing-bottle containing spirit. You should get into the habit of observing how and where the spider spins its web; you will find that some of the traps are most ingenious. Here again the books in your library must be your help. You will find much curious matter on spiders in R. W. G. Hingston's *Naturalist in British Guiana*.

Plants.

The young botanist will find it essential to collect ferns, mosses, flowers, leaves, if he wishes properly to understand his enormous hobby. Some of these things, and particularly the ferns, make handsome museum specimens; they should be preserved so that they can be referred to and closely examined with a lens whenever necessary. First, they must be absolutely dry. There are two ways of drying a plant, the slow way and the quick one. The slow method does

well enough for green parts such as stems and leaves, and for some leaves it is the best. The plant to be dried should be laid out in the desired position on a sheet of thick blotting paper; if very bulky, some of the plant must be trimmed off, so that what remains is reasonably flat. Always arrange leaves so that some show the upper, others the lower surface. If a flower has to be trimmed, cut it open neatly with a razor blade, not quite separating the two halves, and always cut right down to the flower stalk, because parts essential to the identification of the species are contained in the fleshy part of the flower. Take several more sheets of blotting paper, place some above and some below the specimen, and press the whole under two or three heavy books. Of course, a number of plants can be pressed at the same time, but it is desirable to keep each species on a separate sheet. After twelve hours, change the sheets for fresh ones. Repeat this process a day later, and then as may be necessary for the next few days, until the specimens are quite dry. They may then be attached by a spot of fish glue to sheets of cartridge paper, or to a fairly stiff white paper; for neatness, these should be trimmed all the same size, and should be marked in the same place with the name of the plant, date and locality. They can then be stored in trays or in flat boxes; not too many in one container, or the papers will become misshapen.

Always look out for small insects on plants before you dry them. Plants are the natural homes of many insects, some of which live only on particular species. You will usually be able to shake out quite a number from a few flowering grasses which at first sight seemed wholly devoid of them. These insects should be caught with a camel-hair brush dipped in benzine. Preserve them by laying them on wadding in a flat cigarette tin; later, you will find them excellent subjects for your microscope.

To dry flowers satisfactorily has always defied the best skill of the botanist. Sometimes the petals drop off as soon as the plant dies, and invariably the colours change. I prefer on the whole to dry flowers quickly, so as to give some chance of fixing at least part of the original colours. I use a double frame, 12 × 10 in., each half of which is covered with ordinary wire netting of 1-in. mesh. Inside the netting are two layers of cotton-wool. The flower to be dried is placed within the cotton-wool; at this stage both care and patience are needed to ensure that it is in the correct attitude, and it is best to lay it out on a table or board first. The frame is

then closed; you may prefer a clip, but I use a piece of string, because it permits more play. I place the frame in front of a gas fire, and in half an hour my plant is perfectly dry. Just to make sure, however, I remove it from the frame, place it between sheets of blotting paper, put a weight on top, and forget it for the next few days. This method fixes yellow hues very well, also some shades of blue and red; some reds, however—e.g. in the common poppy—tend to turn black, whereas some blues fade away altogether, leaving a parchmenty petal. White petals also commonly become semi-transparent and colourless. Brown and violet hues may preserve very well.

Whatever your method, it is always as well, when commencing to dry the specimen, to make a rough sketch of its parts and to note its colours; this, though often difficult at first, soon becomes extremely easy to many people.

Dried plants are most useful when they show the complete life-history of the plant and all its parts. Thus, for a poppy or a rose you should have roots, stem, leaves, flowers and seed; but in gathering wild plants spare them as much as possible, for many of them are scarce. Usually, to gather several stems and flower-heads does no harm; but to tear up more than one root for examination or through mere thoughtlessness is to depopulate the hedgerows.

Seaweeds.

How often have we been compelled by undiscerning seniors to empty our pockets, and throw away some strongly smelling mass of bits of seaweed, cockle shells, coloured pebbles, dead crabs, cuttle-bone, and other flotsam of the seashore! The attraction, however, continues as strong as ever, and our collection can be made to appeal even to people with the most delicate noses. Seaweeds in particular make beautiful objects when properly preserved. They are to be gathered at any level of the strand from high-water mark to extreme low tide. The most delicate and handsome fronds commonly occur among stouter weeds under the rocks at low water, not being able to endure an exposure of several hours to the sun; such species must be gathered from a boat as a rule, but many of them are torn off and thrown ashore during storms. A number of delicate weeds may commonly be found growing on that storehouse of marine life, the root of a tangle; you will find there also objects like small bits of thin string, which should be cut off and carefully preserved. Seen

under the microscope, they turn out to be singular and often beautiful colonies of polyp-like animals called hydroids.

As soon as possible after collection, seaweeds should be washed in fresh water, so as to free them from salt and dirt; but do not throw the dirt away, for this also contains many curious things, about which I will speak in another section, to those who possess a microscope. The water should be drained off, and the residue dried, put in a match box or small tin, and labelled; it is certain to afford microscopists hours of entertainment during the winter evenings. To mount seaweeds, a suitable frond should be floated in a bowl of water, and a piece of stoutish white paper, previously cut to size, placed under it, and gently raised from one end. As the water drains off, adjust the weed in the desired attitude, using a camel-hair brush. The plant should then be covered with a layer of coarse muslin, then placed between blotting papers and dried in the same way as other plants; but the papers must be changed more frequently. The majority of seaweeds, but by no means all, will adhere firmly to the paper; when this happens, they can be named, dated and stored away. Remember to remove the muslin early in the drying process, otherwise it may mark the specimens.

On many seaweeds you will notice silvery or furry growths. Do not try to clean these off. They are exquisitely beautiful subjects for the microscope, being the skeletons of tiny colonies of "moss animals" or Bryozoa.

Sea Shells.

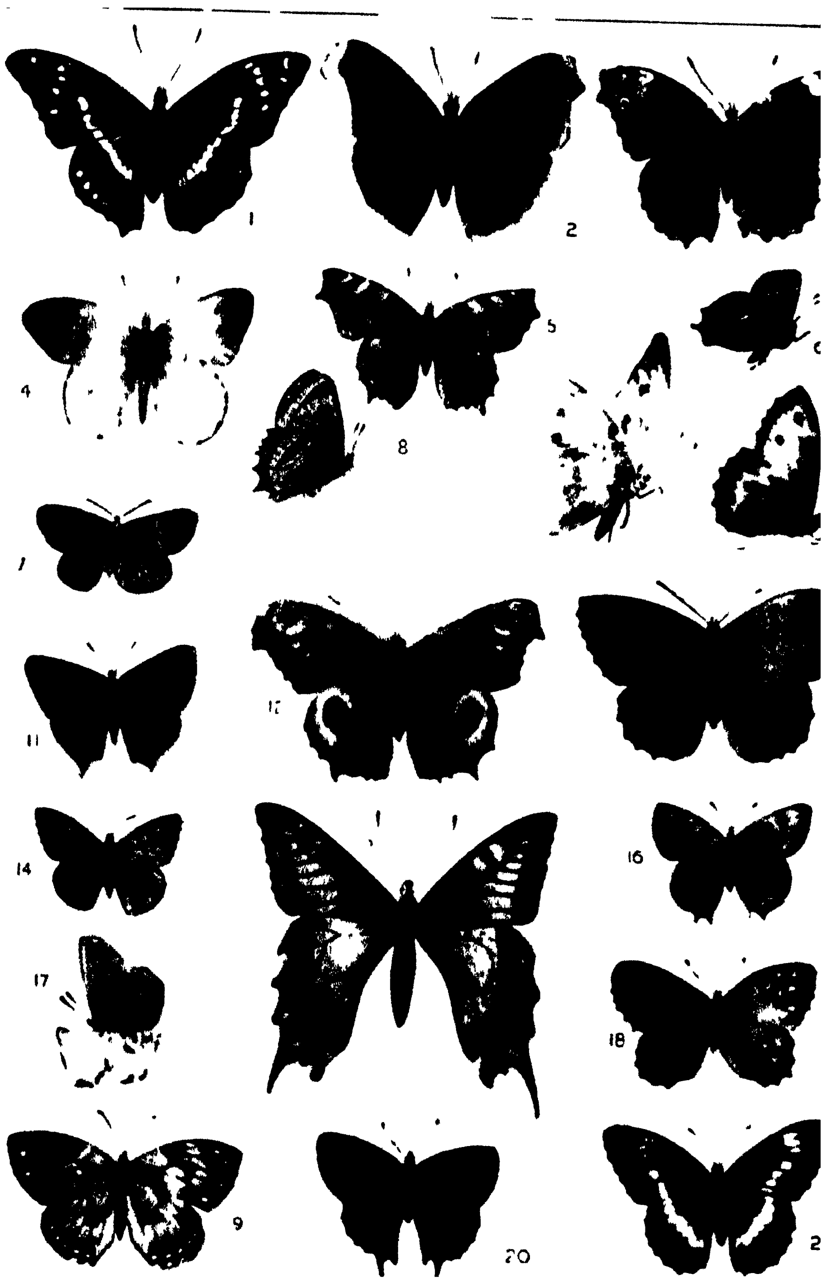
Many sea shells may be picked up by examining diligently the lines of dried seaweed which mark the levels of high water and of storms. Others are rolled up by the waves. Many more can be picked out of rock pools or off the broad brown blades of the tangle. A spade swiftly driven underneath the round holes which are so common in wet sea sands may catch a razor-shell or a cockle. The best means of finding sea shells, however, is to make friends with a fisherman, who (for a consideration) will make you a small dredge and will then take you out with it to search the floor of some sandy or not too rocky bay. To kill your captures, merely drop them into fresh water. Shells which are to be preserved should be thoroughly cleaned of sand and weeds, and the animals should be extracted with a pin. Many coiled spiral sea shells (gastropods or marine snails) have a flat, round horny lid, by means of which the animal shuts itself

within its shell; these lids must be carefully preserved, cleaned and inserted in their shells with a spot of fish glue. Bivalve shells, after being washed, should be lightly tied together with string or tape, so that the two halves or valves may remain shut when the horny hinge has hardened; otherwise the shell will gape. In mounting bivalves for display, by the way, always show one with the valves closed and one open, for the animal's make-up may be deduced from the lines on the inside. Naming your specimens should not involve you in much difficulty, since the common kinds are displayed in the museums of almost every borough. To house collections of shells, the nests of shallow drawers used for stationery are very convenient. Small shells can be stuck on cards, but the larger ones should be held in place by small nails or gramophone needles.

Other Marine Objects.

To describe here the multitude of other marine objects which anyone with curiosity and industry can acquire would take us too far from our present object; but a few brief notes may help. Star-fish should be cleaned in fresh water and laid out to dry in the sun, or in front of a gas fire; this shrivels the soft flesh and destroys the interesting tube feet, but the harder parts remain unharmed. A host of soft or semi-soft creatures, such as Bristle-worms, hydroids, shrimps and their kind, can be killed and temporarily stored in a weak (2 per cent) solution of formalin; one buys 40 per cent formaldehyde at a chemist's, and then to one part of this fluid adds 19 parts of water. Sea urchins can be treated in the same way. All animals with limy shells, however, should be removed from the formalin after a few days, because it eventually dissolves them. The beautiful iridescent worms which burrow in the sand or hide under stones or among tangle roots can be permanently stored in " commercial methylated spirit ", which you may obtain specially from a chemist. Jellyfish and other things of that nature cannot ordinarily be preserved at all; you should study them on the spot and throw them away. Beach fleas and other queer crustaceans haunt the dead seaweed, being scavengers of the most voracious kind; and if you have a crab and do not know how to clean it, just turn back its tail, open it, and the beach fleas will, in a single morning, do the job far better than anyone!

Above all, on the shore, as in the wood, do not forget that note-book!



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Birds' Eggs.

The collector of birds' eggs should remember the warning given by Mr. Seton Gordon on p. 76. For permanent preservation the shell must, of course, be emptied, cleaned and dried. To blow an egg, you will require either a straw with a sharpened end or a piece of fine glass tubing which has been stretched and broken in a flame. First carefully puncture the shell with a fine needle; then, using an egg-drill, enlarge the hole, but keep it as small as you can. Egg-drills can be bought from any natural-history dealer. Taking the blowpipe in your mouth, with the end close to the hole, blow the contents of the egg out by air. Then blow in some clean warm water, rinse the egg thoroughly, and turn it up on blotting paper (with the hole underneath) to drain and dry. If the egg is " turning "—i.e. if it contains an embryo chick– you may have to sacrifice it after all; but frequently, after the watery part of the contents has been extracted, it is possible to soften the rest by filling the egg with water containing a little caustic potash, and leaving it for a day or two. The embryo will then soften, and by great care can usually be extracted. After using potash, however, pay particular attention to washing it all away, otherwise it will cause the shell to decay. Label the egg with the date, site of nest, and size of clutch, also, of course, the species.

Nothing has been said in these notes about preserving the skins or skeletons of small mammals and birds. This, which comprises the art of the taxidermist, is not beyond the skill of older boys; but it is a very special art, which would require a long article. Information on it can be found, however, in the invaluable *British Museum Instructions to Collectors*. Always exercise caution when handling dead animals, especially if you have any cuts on your fingers, or you may get disease germs into your blood—and that, believe me, is no laughing matter!

TAKING AND MAKING PHOTOGRAPHS

Have you ever heard of Joseph Nicephore Niepce or L. C. M. Daguerre? If not, think of them the next time you handle a camera, for it was these two noted scientists who first discovered how to produce a photograph.

Strangely enough, they both began working on the same idea at about the same time, but it was not until they had been experimenting individually for a long time that each learned of the other's existence, and of their kindred interest. They joined forces in 1829, and soon afterwards perfected what is known as the daguerreotype process.

Photography in those very early days, however, was rather tiresome and exacting, and after a great deal of experimenting it still needed an exposure of three-quarters of an hour to get a decent negative. Compare this with present-day photography, when it is possible to get a perfectly defined picture of a fast-moving object in a thousandth part of a second!

Nowadays anyone can get a good negative with almost any kind of camera and, what is more, can learn quickly how to develop negatives and then make either contact prints, or attractive enlargements many times the size of the original.

Photography is an extremely fascinating hobby, but to get the best out of it, you have got to carry out all the several processes yourself. That this is not at all difficult you will shortly learn, but in the meantime let us consider, for a minute, the different kinds of cameras and how they work.

Choosing a Camera.

If you look in the window of a well-stocked photographic dealer's shop, you will doubtless be amazed at the variety of instruments displayed there. These will probably range from a box camera costing little more than ten shillings, to a very small but compact-looking camera—known as a "miniature"—costing anything from £50 upwards. In between you will see folding cameras of various sizes and at various prices; large, cumbersome-looking ¼-plate, ½-plate, or even

whole-plate instruments used for press work, field work, or studio work; cameras known as reflex cameras, having a large sheet of frosted glass in which you can see the subject plainly while you are pressing the trigger, and so on.

If you have never possessed a camera before and you contemplate buying one, you might well be worried by this varied assortment of instruments. Which shall you buy? Which will give the best results? You may say, "I expect the more expensive the camera, the better the results." This may be true, but like so many truths it is only a half truth, for an expensive camera will give better

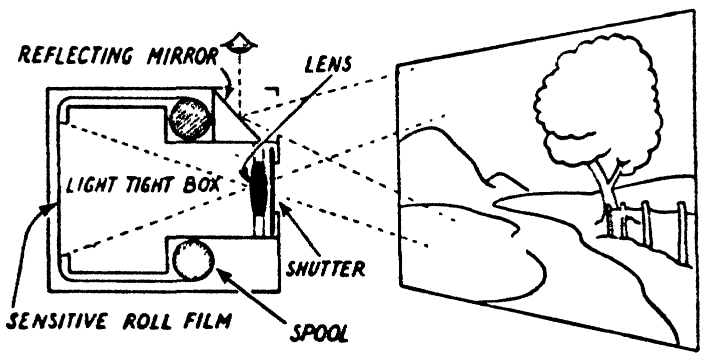


Fig. 1.—Essentials of a simple camera

results than a cheaper one, provided that you know how to use it. This is an important point, and if you have had no experience you will not know how to use it, and it is then ten to one that you will get better results with a cheap camera. That is why beginners are best advised to start off with an ordinary box camera, or a cheap folding camera. When you can handle these properly, *then* is the time to go in for something more elaborate.

All cameras, of course, have the same common characteristics, and in order to start right we must know what these characteristics are. In the first place, then, the camera itself is a box which is perfectly light-tight. At the back we fit a glass negative or a celluloid film which is coated on one side with a special emulsion made sensitive to light. All the time this is kept in the dark nothing happens to it, but immediately it is exposed to light it takes on the light and shadows which it "sees". Thus the front of the camera

is fitted with a lens covered by a specially designed shutter. All the time the shutter is kept closed no light can get through the lens, but immediately it is opened, by the action of pressing the trigger, light goes through the lens and on to the plate or film (fig. 1).

Apertures and Times.

Better-class cameras have, in addition to the shutter, a specially designed diaphragm which can be opened or closed to give different-sized apertures. This diaphragm is a very clever arrangement and consists of a series of curved metal plates fitted inside the lens tube and attached to a ring on the outside of the lens mount. By revolving the ring, or moving a pointer, the plates are made to open and close, thus forming apertures of different sizes.

It does not need much common sense to appreciate that the more the diaphragm is opened the greater the amount of light which is able to get through. This is important, since it means that whilst an aperture of a certain size would admit sufficient light on a bright sunny day, it would require a much bigger aperture to admit the same amount of light, in the same time, on a dull day.

Leaving out focussing for the moment, a perfect negative is obtained by using the correct aperture, together with the correct speed.

In an ordinary box camera there is no diaphragm to enable different apertures to be made, but there are slight variations in respect of time. Many box cameras have three letters on them-T B I.—standing, respectively, for Time, Brief and Instantaneous These enable the user to expose the film for several seconds or even minutes—known as a Time exposure; or for one or two seconds—known as a Brief exposure; or for a very rapid exposure (actually $\frac{1}{25}$ of a second)—known as an Instantaneous exposure. These differences are obtained by different methods on different models, and it would take considerable space to deal with them all. Always, however, they are simple to understand, and any dealer will explain them in a couple of minutes.

Getting out of the box-camera class, we have instruments with wider ranges of apertures and speeds, and, generally speaking, the more expensive the camera the wider are these ranges. A comparatively cheap folding camera will have three or four different apertures, and probably four or five different speeds (fig. 2).

The apertures will probably be labelled "f 16", "f 11" and

" f 8 ". All apertures are numbered in this way, and the great thing to remember about them is that the bigger the number the smaller the opening. Thus, when you set a camera at f 16 you have a much smaller aperture (admitting much less light) than when you have it set at f 11. Similarly, at f 11 you have a smaller opening than at f 8. Generally speaking, the duller the weather the bigger the aperture, and you will therefore use your apertures—or " stops " as they are called—to suit the conditions. On a dull day you may have to use f 8 in order to get a good picture of a certain subject, whereas on a bright day you will get a perfect picture of the same subject, with the same speed, by using f 11 or even f 16.

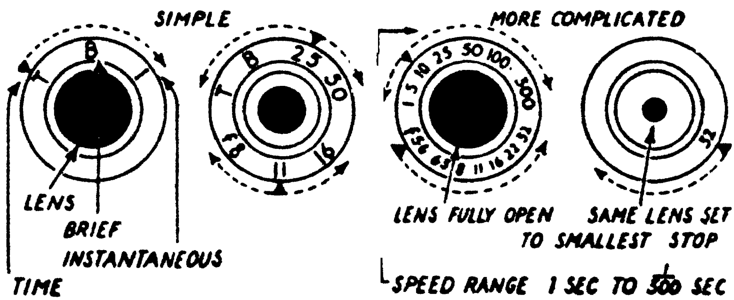


Fig 2.—Lens and Shutters

This small letter f simply means the proportion of the diameter of the stop to the focal length of the lens. Thus f 8, for example, is of a diameter $\frac{1}{8}$ the " focus " of the lens. It would take considerable space to describe this relationship fully, nor would it serve any useful purpose here. It is important to note, however, that the stops are so arranged that each aperture requires double the exposure required by the preceding aperture, and half of that required by the following aperture. Thus, for example, twice the exposure is required for f 11 as for f 8, and half the exposure for f 11 as for f 16, all other things being equal.

Time variations on an average folding camera may be marked something like this—" T, 1/10, 1/25, 1/50, 1/100 ". " T ", of course, stands for " Time " again, and enables you to expose for several seconds or minutes. The figures represent fractions of a second. If, therefore, you place the indicator on " 1/25 ", your shutter will open and close in $\frac{1}{25}$ of a second; if you place it

on " 1/50 ", it will open and close in 1/50 of a second, and so on.

The success of your negatives depends upon the correct use of your stops in relation to times. This relationship can always be obtained very accurately by using an exposure meter, and the possession of one means a very big saving in spoilt and inferior negatives. Exposure meters vary in price from a pound or two up to about £10, and all are very simple to use. You merely point them at the object to be photographed and take off a reading on a special scale. This reading tells you what speeds to use for various stops.

Until you are lucky enough to own an exposure meter you will have to learn to use your stops and times intelligently, and the best way to do this is to work on the following lines.

On an ordinary summer day between, say, 10 o'clock in the morning and 3 o'clock in the afternoon, you will get perfect pictures of fixed or very slow-moving objects, using f 11 and giving 1/25 of a second. If a subject is moving fairly quickly, you will increase the stop to f 8 (or f 5·6 if you have it) and decrease the time to 1/50 or 1/100 of a second. In other words, the faster the object the bigger the aperture and the quicker the speed. If the weather is dull, or it is early or late on a summer's day, you will increase the aperture accordingly, but keep the time the same.

Using f 11 and 1/25 second as a basis, you can reckon, as already pointed out, that one stop larger (f 8) will double the exposure and one stop smaller (f 16) will lessen it by half. Similarly, keeping the stop unchanged, but altering the time, an exposure of 1/25 second will be twice as long as an exposure of 1/50 second.

This may all seem a bit complicated, but a little experimenting, using different stops and different times, will quickly teach you what to do under varying conditions. Take a whole roll of film of the same subject, altering the stop and time for each exposure, and keep a careful note of what you have done. Then compare the results, and you will learn more than you can learn from reading a thousand words on the subject.

The other important thing connected with a camera is the question of focussing. This is where a reflex camera scores over most others. You will remember that it has a frosted glass screen in which you can see the subject while you are photographing it. The bellows on a reflex can be extended or brought back by the turning of a knob, and you proceed to work this knob until your picture is

perfectly sharp on the glass screen. You then know that your picture is in focus.

On cheaper cameras, which do not have this screen, you will probably find a scale of distances round the lens of the camera. These are distances of, say, 5, 10, 15, 20 feet, and so on. In order to focus these cameras correctly, you must judge the distance of the subject from the lens, and set the distance scale at this figure.

Selecting Film.

One other thing to be considered, in connexion with the camera itself, is the choice of film or plate. Considerable progress has been made, in recent years, in the manufacture of plates and films, and the majority have reached a high degree of perfection. Moreover, they are manufactured in scores of different grades and speeds, and the average amateur would be amazed if he were able to see a complete range. The professional, of course, finds this extensive range of great service, but it would merely confuse the novice. All the amateur needs to know is that there are three main divisions of plates and films, known, respectively, as ordinary, chrome and panchromatic.

All the well-known makes of films and plates can be purchased in these three classes, and the variations in price amount to only a few pence.

Ordinary film is now rapidly going out of favour, and for all general work it is advisable to use chrome film. This is more sensitive to some colours than ordinary film and therefore gives better results. It is rather better for greens, for example, but since it will only photograph part of yellow and none of red, it is of little use where bright colours are concerned.

Panchromatic film is sensitive to all colours—even to red—and thus it is of great service in giving true tone renderings in pictures where the variations in colour are very marked.

You will find it a very interesting experiment to arrange a vase of flowers, covering as many colours as possible, and photographing it first with ordinary film, then with chrome film, and then with panchromatic film. Compare the results after development, and you will doubtless be struck by the amount of detail in the last-named, compared with that in the other two.

Apart from its ability to separate colours, panchromatic film has another big advantage in that it is much faster than ordinary film

or chrome film. It is therefore very useful for indoor work and for work on dull days. It is ideal, too, for portraits, and gives fine renderings of landscape scenes.

When handling panchromatic material, both before and during development, great care must be taken to keep it away from all light. Remember that it is sensitive to red light, and you therefore cannot use a red lamp in the dark room. The best lamp to use is a green one, and it should be kept at least six or eight feet away from the film.

Taking the Picture.

So much for the actual working of the camera. It may now be worth while considering a few important points which are essential if you are to be certain of getting good pictures at almost every attempt.

In the first place, then, always make sure that your camera is steady. This is important, and it is worth bearing in mind that, providing you have focussed correctly, the steadier the camera the sharper the picture. For anything over $\frac{1}{25}$ second, try to stand your camera on a firm object so that fear of movement is lessened; for $\frac{1}{25}$ and less, hug the camera tightly to the body and try to hold the breath at the moment the shutter is released. Press the trigger firmly but gently. If you jerk it, you may easily move the camera and spoil the negative.

The second thing to be careful about is the light. Never point your lens in the direction of the sun. If you do, you will almost certainly get a failure. The golden rule is—sun almost behind you, if possible; if not possible, then well to one side of you.

In the third place, pay very special attention to backgrounds. So many otherwise very good pictures are completely spoilt through lack of attention to this detail. How many times, for example, have you seen a picture of a friend, posed against the wall of a house or a shed, and looking for all the world as though a drainpipe is growing out of the top of his head! Or, again, you may have seen an otherwise good portrait study—but with the subject standing next to a dustbin! It needs only a little thought and attention, before pressing the trigger, to see that all these ugly things are kept out of the picture. A good idea, when taking a portrait, is to stand the subject as far away from all backgrounds as possible. Failing this,

try to get a shrub or a hedge or a flower border as a background —in short, something attractive.

Another important thing to study is viewpoint. If, for example, you are taking a building or a bridge or a monument, do not just lift the camera and snap it without first studying the subject in relation to its surroundings. There are always one or two views of anything which are more attractive than others. Your business as a photographer is to look for these viewpoints and not to expose

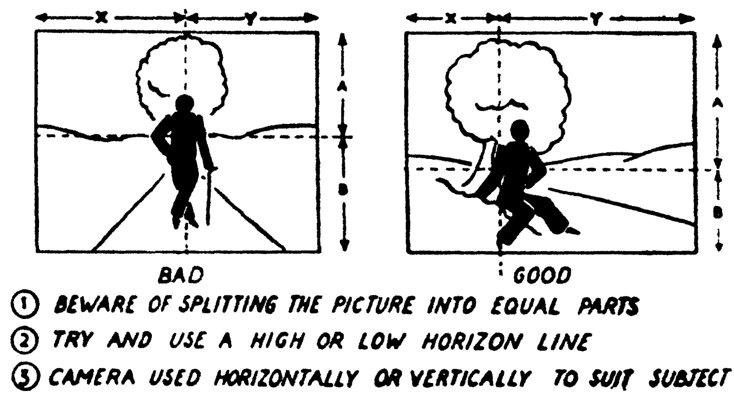


Fig. 3.—Composition

your film until you are satisfied that you have found the best viewpoint possible (fig. 3).

When taking moving objects snap them as they come towards the camera or are going away from it. You will get far better results in this way than if you try to take them as they flash across the front of the camera. The same principle applies when you are photographing from a moving object—a train, for example. Either photograph your scene as it comes towards you or as you are leaving it.

Developing.

Earlier on in this article I said that a lot of the fun in photography came from developing and enlarging one's own negatives. That more amateurs do not do this is probably due to the fact that the majority of them believe the work to call for a special dark room, a good knowledge of chemicals, and more than average skill. Such,

however, is not the case. It is true that the making of exhibition prints may call for specialized knowledge, but it is equally true that it is well within the power of any boy to develop any film satisfactorily and to make creditable enlargements up to whole-plate size.

Let us, then, consider developing first. As far as this is concerned, the days of the old dark room, with a smelly oil lamp and the use of messy chemicals, is a thing of the past. The modern amateur does nearly all his developing in daylight! This is made possible by the use of special developing tanks. There are a number of these on the market, and a good one can be purchased for less

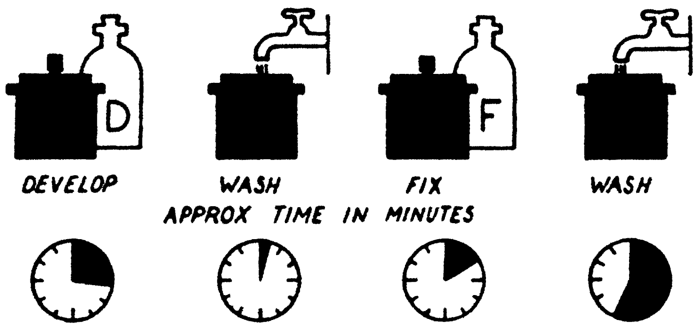


Fig. 4—Daylight tank development

than £1. The majority will, of course, only accommodate films, but most of them will take films of varying sizes.

A developing tank is quite a simple affair, and consists of a special spool on to which the film can be wound and which is then placed in a light-tight tank. Developer is poured into the tank and is allowed to remain there for a certain time, depending upon the temperature of the developer.

Assuming you have a tank, the first thing to do is to get the film wound on to the spool. This is done by shutting oneself up in a light-proof cupboard, separating the film from its red-paper cover, and winding it carefully on to the spool. The spool is then placed into the tank and the lid put on tightly. You can now come into the daylight and do the rest without resorting to a dark room at all.

The next thing to do is to prepare the developer, and here you may use either a powder developer, a liquid developer, or a tablet developer. Whichever it is, full instructions will be given with it for tank development.

One of the best developers is undoubtedly an M. and Q. developer (Metol and Quinol), made up in powder form at about 3*d.* a packet. You mix the powders, as directed, in a given quantity of water and take the temperature. Reference to a time-and-temperature chart, supplied with the developer, will then tell you how many minutes to keep the solution in the tank (fig. 4). Note the time when you pour it in, find out from the chart how long to keep it in according to the temperature, and at the expiration of the time pour it away.

Meantime, you will have prepared an acid fixing bath. Tins of acid fixing salts—usually containing one pound—can be obtained from any chemist, and the instructions on the tin will tell you what proportion of salts to mix with a given quantity of water.

As soon as you have emptied the developer from the tank, fill the latter up two or three times with cold water and so give the film a good rinsing. Then unfasten the tank, take the film out and place it immediately in the fixing solution. It is best to do this in subdued light, but this only means going to a corner of the room where there is no direct light from a window.

When the film is taken from the tank you will probably notice that it has a thick white coating on one side. After it has been in the fixing bath a few minutes, however, this coating will begin to disappear. You must leave the film in the fixing bath until the coating has totally disappeared—a process which usually takes about 10 minutes. You will help the fixing solution to do its work better by taking one end of the film in each hand and gently passing it to and fro through the solution.

As soon as a film is fixed it must be thoroughly washed, and then left in running water for about half an hour. After this it can be hung up to dry in a clean, airy spot. A shelf in a warm room or a shelf in a greenhouse make ideal drying places, and the great thing to guard against is specks of dust getting on the film and drying into it.

And that is all there is in modern developing—nothing to worry about at all, and if you follow the developer instructions carefully you will never get a failure.

Printing.

There are two ways in which you can get finished pictures from your negatives—either by contact prints or by enlarging. In the first way you can only get pictures the size of the negative; in the

second you can make pictures several times the size of the negative.

Contact printing can be done either on daylight paper or on gaslight paper. The two methods differ in operation, and the results are different. The former gives a sepia-looking finish; the latter gives a black-and-white finish.

For either method of contact printing you will require a printing frame, and one of these can be purchased from any chemist for a shilling or two. It has a glass front and a special wooden back which is kept in position by a metal strip. Negative and paper are placed on the glass, and the back is then clamped down to prevent them from moving.

At this point it may be well to mention that there is a right and a wrong side to both negative and paper. A negative has one side shiny and the other side rough. Paper has one side shiny and the other side plain. The rough surface of the film must always be placed against the shiny side of the paper, and the shiny side of the film must be placed face downwards on the glass.

Apart from the resulting tones (sepia against black-and-white), the main differences between daylight printing and gaslight printing are these. Daylight printing requires no developing, only fixing; gaslight prints require both developing and fixing. In daylight printing you can watch the image forming on the paper; in gaslight printing no image can be seen until the paper is placed in the developer.

For daylight printing you must use what is called self-toning paper. This can be bought very cheaply and in various sizes. Be careful not to open it in sunlight but open it instead where the light is very subdued. Place the negative against a sheet of this and put it in the printing frame. Place the frame in the light of the sun, and the picture on the negative will quickly begin to form on the paper. The process can be watched by letting down the small hinged portion at the back of the frame and taking a careful peep at a corner of the paper. Leave the paper in the frame until the image is beginning to get a little on the dark side, and then take the paper out and immerse it in a bath of hypo. This chemical, in the form of crystals, can be purchased very cheaply, and the directions on the box will show how to mix it with water and make a solution. Keep the print in the hypo bath for about 10 minutes and then rinse it in running water for 20 minutes and put it out to dry.

For gaslight printing you will need a dark room, but one can

easily be made by pinning a large sheet of brown paper over the window of a bathroom or kitchen. It is best to work in one of these rooms, since then you will have a supply of running water handy.

As mentioned before, gaslight printing is a little more complicated than daylight printing, but it is, nonetheless, quite easy to carry out. This time you will need a developer and fixer as you did for film development. M. and Q. Developer, in powder form, will be perfectly satisfactory, and the directions on the packet will show you how to use it—generally the contents of the packet dissolved in 4 oz. of water. The directions on the tin of acid fixing salts will also show you in what proportion to mix these with water.

After the print is taken from the printing frame it is first placed in the developer, then rinsed in cold water, and then put into the fixing solution. You will therefore require three dishes, and you can either purchase proper dishes for the job—costing no more than a shilling or two each—or you can use ordinary pie dishes. Arrange the dishes in a row and into the first pour the developer. Half fill the second with water and put the fixing solution into the third.

You will need a red lamp, and a good idea here is to get an electric rear light as used on bicycles. It is merely required to give sufficient light to enable you to see how to put the printing paper in the frame properly. Gaslight paper is naturally very sensitive to artificial light, and you must therefore be careful to keep it away from all light, except during the actual exposure.

Prints can be made either by gaslight or electric light. The latter is by far the more convenient, since it can easily be switched on and off. If you are forced to use gas, you must work in one room and make your exposures in another.

Place the negative and paper in the printing frame by the aid of the light from the red lamp, and then hold the frame tightly to the body (to keep out all light) while you switch on the electric light or go into another room where there is gaslight.

Printing is done by holding the frame about a foot away from the light. The time it should be held there varies considerably, according to the density of the negative and the kind of paper being used. An average negative will probably need about 6 seconds, but you will find the correct times only by experimenting. You are bound to waste a few sheets of paper while doing this, but you will quickly know, simply by glancing at a negative, roughly how long it will take.

As soon as you have made the exposure, press the frame tightly to the body again and switch off the light. Then take the paper from the frame and immerse it quickly in the developer. By the light of the red lamp you will see that the paper is perfectly white, but after it has been in the developer a few seconds the image will begin to appear. Gently rock the dish until development is complete, and then take the print out and wash it in the dish of cold water. Then place it in the fixing solution and leave it there for about 10 minutes. After this time place it in a bowl of running water for about half an hour and finally lay it out to dry.

You can, of course, go ahead and make your next print as soon as the first is in the fixing bath, but if you do this put the print face downwards in the solution so that the light does not get at it.

Enlarging.

Enlarging is carried out in very much the same way as gaslight printing, except that different paper is used. That used for enlarging is known as bromide paper.

At this point it might be well to consider, for a moment, printing papers in general—both for gaslight and enlarging. Actually there is a very extensive range to choose from, and papers are manufactured to suit every kind of negative. There are, for example, a large number of different surfaces, and one can get a matt finish, a velvet finish, a smooth finish, a rough finish, a glossy finish, and so on. There are also a number of tints, among which buff and cream are the most popular for certain types of work. The choice of paper depends upon the type of subject. Thus a piece of furniture looks best on a smooth or glossy surface, whereas a country scene is probably more attractive on a matt or a velvet surface.

Apart from different surfaces, however, papers have different grades. Generally speaking, there are three of these—soft, medium or normal, and vigorous. It is possible to obtain nearly all surfaces in any one of these grades, and thus one can get a good contact print, or a good enlargement, from almost any negative.

The grade of paper to use is governed by the nature and quality of the negative, and all negatives should be studied carefully before the paper is chosen. Experience is a good teacher here—as with the times necessary for gaslight printing—but the following principles act as a useful guide.

A negative which has been slightly over-exposed or over-

developed, or which contains strongly defined contrasts, will need a soft paper. On the other hand, an under-exposed or under-developed negative, or one with poor contrasts, will require a vigorous paper. More or less perfect negatives, coming between

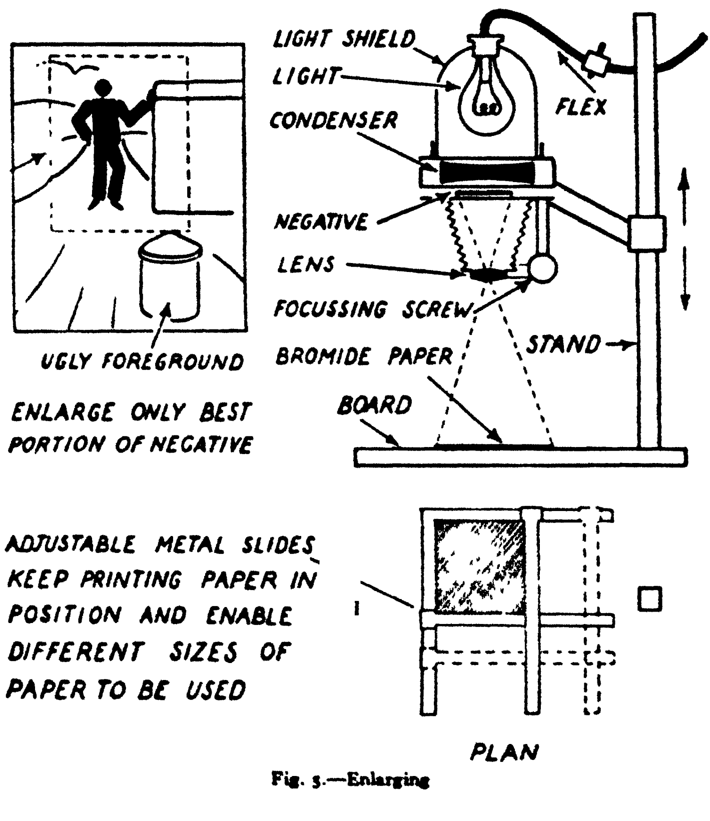


Fig. 5.—Enlarging

these two extremes, will print best on a medium or normal paper. The thing to remember is that vigorous paper will bring out and sharpen the details, whereas soft paper will tend to thin them and tone them down.

We return now to enlarging, and it can be said that this is undoubtedly the most fascinating of all processes connected with photography (fig. 5). Not only can you make a picture several times larger than the negative, but by so doing you often bring out much

beauty and detail which are hidden in a small contact print. Apart from this, however, you can change a picture considerably by enlarging that part of it which appeals to you. For example, you may have a very pleasing portrait study, as far as the head and shoulders go, but totally spoilt by ugly things standing near the feet of the subject. With an enlarger, however, you can make a picture of the head and shoulders only and get a remarkably attractive result.

Again, you may have a very fine picture of a country scene showing a typical old country shepherd driving a flock of sheep along a narrow, picturesque lane, but spoilt by a modern car just making its appearance in the background. When enlarging, however, it is quite easy to cut out this car and so get a truly rural scene with every detail in keeping.

Yet again, you may have a good picture with all the details in keeping, but which is badly balanced—too much foreground or background, or too much uninteresting detail on one side. By careful arrangement you can alter the shape of the enlargement considerably and so make the picture far more pleasing.

Enlargers are sold in two styles—horizontal and vertical. The former, however, is rapidly going out of favour altogether, and the latter is undoubtedly the better to work with. In a vertical enlarger the apparatus is mounted on a steel or wooden upright and is made to slide up and down. It consists of a lamp chamber (housing an ordinary electric bulb), a condenser, a glass slide into which the negative is placed, and expanding bellows which terminate in a lens. The steel or wooden upright is fixed to one end of a large wooden base, usually covered with something white.

Before you start to use paper for enlarging, place the negative in the holder and slide the enlarger up, or down, the upright until you have roughly the size of picture you require. You then focus accurately by moving the bellows up or down. Focussing is done by watching the picture on the white base. This picture is always interesting when you see it for the first time, since it shows clearly what your picture is like. By studying it carefully you can decide both what to cut out—if anything—and what shape to make it if it is not satisfactory as a whole. The best way of doing this is to use pieces of cardboard cut in the shape of a letter L. By placing one across the other and moving them about, you can frame the picture to the best advantage and thus plan how to enlarge it.

The base of some enlargers is ruled off in sections so that you know exactly where to place the paper when you are ready to make the enlargements. If there is no such arrangement, you can use one of your L pieces and place it in such a position that it will form a boundary for two sides of the paper.

Bromide paper is generally more expensive than gaslight paper, and since you are using it in large sheets it is obviously not wise to waste it in trying it out for the correct exposure. The best way of finding out the correct time for a particular negative is to carry out what is called a "strip exposure". Some makers of printing paper include a few strips—usually about an inch wide—in every packet, but if no such slips are provided you can make a few by cutting up a sheet of paper.

To make a "strip exposure", proceed as follows. Place the strip on the base of the enlarger so that it occupies a position roughly across the centre of the picture. Then cover three-quarters of the strip with a thick piece of cardboard and expose the odd quarter for 3 seconds. Move the cardboard along to the centre and expose the next quarter for a further 3 seconds. Move again and expose the third quarter for another 3 seconds. Finally, remove the cardboard altogether and expose for another 3 seconds. You will now have a strip with four exposure times—12 seconds, 9 seconds, 6 seconds and 3 seconds. Develop it and examine it and you will then have a very good idea of the correct exposure to give. You can now arrange a whole sheet of paper on the base of the enlarger and expose for the correct time.

Developing and fixing are carried out in exactly the same way as for gaslight prints. First put the paper into the developer until the image appears and full development is complete, then a rinse in the cold water, then in the fixing bath for 10 minutes. Finally, a good wash in running water for about 30 minutes, and then careful drying in a warm, clean place.

Glazing Prints.

Some amateur photographers admire the highly glazed prints which are always delivered when one has a film developed and printed at a chemist's. Many imagine that a special paper is used in order to get this finish. Such, however, is not really the case, and glazing is a separate operation performed after the prints have been washed.

Actually it is a simple process, costs little or nothing to carry out, and apart from leaving prints with a high polish it flattens them out nicely.

All that is necessary is to place wet prints firmly on to a glazing surface and leave them to dry. When dry they peel off and are found with a highly polished surface. Several materials are suitable for glazing; they include glass, ferrotype plates, enamel and celluloid sheets, and chromium-plated brass boards. The latter are the most desirable, and they give perfect results. They are, however, rather expensive to buy. Perfect results can also be obtained with any of the other surfaces mentioned, however, provided care is taken to see that they are perfectly clean. This is not always easy, but the difficulty can be overcome by using a glazing solution. Such a solution can be made up from crystals or liquid sold for the purpose and obtainable very cheaply from any photographic dealer.

Ferrotype plates cost a shilling or two each, and will take up to four half-plate prints at a time. Enamel and celluloid sheets are also reasonable in price but are not easy to obtain.

Whichever surface is used, wash it thoroughly with soap and water and give a thorough rinsing with clean water. Then place the wet prints face downwards on the surface, cover them with blotting paper and roll them firmly with a rubber squeegee. It is very important to remove all moisture, and if there are any air bubbles under the print the latter will not take the glazing perfectly.

If using a flexible surface—such as, for example, a ferrotype plate—a better plan is to run the plate and prints through a household mangle; always provided, of course, that it is fitted with rubber rollers.

Prints should be left to dry slowly, and if you attempt to hasten them—by putting them in front of a fire, for example—you will almost certainly get cracks and drying marks. Stand them in a warm place, away from draughts, and leave for about 12 hours. They should then peel off easily and reveal a perfect glaze.

RAMBLING, CAMPING, CLIMBING AND CAVE-HUNTING

RAMBLING

When first I spotted the Very Young Adventurer, he was balancing himself on the edge of the pavement, obviously uncertain whether to go north or south, east or west. He was about sixteen years of age. He wore a Scout's hat, an open-necked shirt, a pair of khaki shorts, football socks, heavy boots, and he had a sort of pilgrim's staff in his hand and a silver whistle in his breast pocket. It was raining, and he did not look happy. I thought at first that he must be moving, for across his back was slung the largest collection of blankets, tent, rucksack, and whatnot that I ever saw upon so small a human being From the back of this pile a second pair of heavy boots hung down, and a tin cup, spoon and fork clattered against each other. This young man now took out of his other breast pocket a folded map, whereupon I perceived that here was the complete Hiker, once known in this country as a rambler, stroller, or walker for pleasure. Having indulged in this amusement myself for the better part of a lifetime, I could not help thinking how much the youth had to learn, and how I myself had been taught by experience what not to do when touring on foot. Out of those thoughts this article developed.

Rambling is the most enjoyable and healthful of all pastimes. A good walking tour, properly planned, systematically carried out, and with good company, makes a memory for a lifetime. Never, never shall we forget the days we spent on one such tour, when an unwontedly kind summer poured warm sunshine upon our heads, as we skirted the edges of lovely beechwoods, or dipped beside some willow-bordered stream—crossing by means of a most unsteady plank, in imminent danger of diving into three feet of mud —or followed tracks through cornfields to the broad black highway, there for a brief hour to come back to the world and to mix with its traffic; or passed through gates and over stiles to our

camping-ground, scaring the rabbits and hares, and watched by an inquisitive chaffinch and a wide-eyed sober-looking thrush, as we erected our tent beneath the shelter of a wide-spreading beech tree. The hush in the air as twilight deepened, the fanciful figures dancing in the shades, the last pale flicker of our spirit stove as it coughed its way out, the snuggling up within a warm blanket, the deep still sleep that always follows reasonably hard exertion, the waking fresh next morning, the smell of bacon and sausages in the pan, the packing up and departure for the mountain which was the next stage of our journey—what joys were these, never to be forgotten in later years! Would you like to experience such joys too? Very well; let us set about it in earnest.

The first essential for a rambler is a love of rambling; it is no good attempting this rather strenuous exercise unless one is prepared to see the thing through. This entails a certain amount of fitness, even for a single day's jaunt; and fitness is not to be acquired except by practice. Perhaps the best way in which to start is to select one, or at most two, congenial companions, and in their company to tackle an afternoon stroll—say, across country to the local river, along the bank and footpaths, tea at some little wayside place, and back again before dusk; not attempting more than seven to ten miles, and the shorter distance first. Start this kind of training in the very early spring, when at dawn the fields are still white with frost. Repeat it every weekend, on Sunday mornings if you like—so many fellows find themselves fully occupied on Saturday afternoons!—until you can knock off a dozen miles, carrying a knapsack, without thinking much of it, and without damaging your feet. Then attempt an all-day stroll of perhaps twenty miles, taking with you enough equipment to provide your own lunch and tea. I will enlarge on equipment later, but you will soon learn by practice not to forget the matches or (whisper it not to our friends!) the tea. By the time mid-July arrives—possibly the best season for holiday-making in our variable climate—you can tackle a walking-tour with confidence. Never do too much—or too little! Never get too tired. Above all, never lose heart; your friends may be feeling much worse than you do, but they will not dare to show it. And rest, supper and bed are complete cures for most ailments of the tired rambler.

What to wear is a perennial subject of discussion. Many people prefer shorts, open-necked shirts, no hat, and bare arms. This is all very nice, particularly on a single hot afternoon, when the weather

may be fairly predictable; but believe me, it is less attractive for a long tour, because our fickle weather may be cold and grey one day and blazing hot the next. I myself never wear shorts, except for racing, a type of walking which has nothing to do with rambling. I never carry a stick; no properly balanced walker needs one. I never wear heavy boots, for I like to feel the play of my feet around my ankles. And I prefer an old hat with a wide brim, or for preference a cap, which fits snugly to the head in all sorts of winds, and the peak of which makes an admirable protection against strong sunlight. Cycling or golf knickers are favoured by some people; but it always seems to me a little unwise, because a walker should be as unrestricted as possible, consistent with warmth, and knickers must bind below the knee. For this reason, braces are preferable to a belt. You will want a light but good woollen vest (nothing else can be depended upon to keep off a chill should you perspire—as perspire you will); also short loose pants, a pair of old flannel trousers, clean and creased—there is no reason why we should look like tramps, even though tramping be our intended business; any shirt that takes our fancy, with soft collar and a club or school tie; a good warm sports jacket; socks of medium length, and boots in preference to shoes. Such an outfit, with the addition of a light-weight mackintosh that folds into a matter of a few square inches, will suffice for most places in England. (The special needs of mountainous country will be considered later.)

One's feet and everything connected therewith are most important. One should always keep the toenails closely trimmed, being especially watchful of any tendency of a nail to grow into the side of the flesh. Before starting out, even for a half-day stroll, it is wise to smear a little vaseline between the toes and round the heel, inside the sock; this seems a messy business, but it lubricates the foot and greatly reduces the risk of blisters, which occur solely because of friction. The socks should be a trifle large rather than small, but not so large as to pucker, or you can count upon blisters for a certainty. Remember, when strolling all day the feet get very warm and must expand; and if you do not allow room in your shoes for that expansion you may look out for trouble; therefore, it is always good horse sense to wear boots or shoes that are half a size too large. If visiting rough, stony places, such as hill tracks or gritty roads, stuff a little cotton wool round the mouth of the boot, so as to keep out grit. Shoes or boots should be broad enough for the feet

to rest flat in them; many makes, unhappily, are so cut away on the inside of the front that they throw the foot over, and such shapes are quite unsuitable for distance walking, whatever the salesman may say. As to the nature of one's footwear, this, of course, depends upon what one is going to do. For walking on the road (which, by the way, has its own peculiar attraction, especially to solitary strollers) quite different gear is needed from that for the heavy ruts of ploughed fields, or the loose stones and spiky plants of paths and hill tracks; different again is the footwear wanted for wet places such as damp woods and meadows. On roads, I recommend light boots or shoes, as soft as practicable, with leather soles and half-rubbered heels, just a bit worn at the heel. On *main* roads in England one can travel very considerable distances even in canvas shoes, without risk of trouble. Hill roads need strong boots; and if you intend to do a little climbing, or even if you are working along a coast, where slippery rocks and weeds abound, nails in toe and heel to grip the treacherous surface should be added (though, of course, nothing like the number required by the mountaineer). For all wet places, rub plenty of dubbin into the stitching and cracks; boots for that type of adventure should also have the tongue stitched to both sides. Whatever you wear, always take pains to see that there are no projecting nails or rough edges inside the boot or shoe; and if you are not satisfied, line it with a light felt sock.

Even the hardiest and most skilled walkers pick up blisters—usually, it must be confessed, from neglecting some of these precautions. If such should be your fate, the problem can be dealt with promptly, firmly, and not too painfully, in this wise. No real wanderer in lonely places goes without an iodine pencil, which is simply a small bottle of iodine with a double screwed stopper, which goes into one's pocket like an abbreviated fountain pen. In your pocket-book you should also carry a piece or two of Elastoplast, a little flat wad of cotton wool, and a needle. If you have picked up a blister, say on the pad of the foot or the edge of your heel, take off the shoe and sock; and if there is any dirt on the foot, wipe it clean. Then run a little iodine over the sore place. Dip the end of the needle into the iodine and prick the blister, taking care not to prick inwards, but sideways, or you will puncture the under-skin. Then prick it at any other point; two holes are necessary to get all the fluid out. Normally the blister should then collapse. If you smear a little vaseline over a patch of Elastoplast of the right size,

and stick the latter firmly over the wound, you will be able to walk for hours in comparative comfort. The best way of dealing with the blister nuisance, however, is to be careful where you tread, and so avoid getting them!

Next, we come to the equipment for our expedition; and although we all have ideas of what we would like to take, the question really does not admit of much choice. Either an item is *necessary* or it is not; if it is not, don't take it. This rule applies whether you intend to camp out for the weekend or to go for a fortnight's tour. He who travels light travels far; he who travels far travels easily.

You will want a fairly large rucksack, with broad straps, so that the weight lies squarely and evenly upon both shoulders. This is undoubtedly better than a haversack, although personally I prefer the latter, as it allows me more freedom of movement.

Assuming, for the nonce, that you intend to sleep at one of the many Youth Hostels or C.T.C. houses, you will be able to dispense with camping gear; this is a great boon in one way but a distinct loss in another. You can then enjoy a warm bed, and frequently also a good bath; on the other hand, you are not really as free as you would be with the cold blue stars for your canopy. Sleeping "in" at night, however, need not restrict your movements. In recent years, the number of Youth Hostels, where a good bed, supper and breakfast are available, and the best scenery of the island is within reach, has grown tremendously. A list can be procured from the Secretary, Youth Hostels Association, Howardsgate, Welwyn Garden City. As to the shops, restaurants and smaller inns approved by the Cyclists' Touring Club, every town of any note, and many a smaller place too, has one of these useful establishments. Apart from these organized conveniences, farmers are frequently willing to provide a bed and breakfast; and if one is content to chance disappointment once or twice before finding a place where one can put up for the night, one can do worse (in normal years) than trust to chance for one's lodging. It should be borne in mind that if the last plan be followed, a single person can generally be accommodated without much difficulty; for two it is less easy, and three becomes a crowd.

Returning to one's equipment; it is better to take a stove and fuel than to light fires, because (apart from other reasons) in this crowded island fires are a real menace. The holiday season some-

times provides dry weather, even in England, when bracken will burn like tinder, and valuable woodlands and picturesque heaths may easily be reduced to a blackened wilderness through some chance fire. If you must light a fire, all warnings and threats of prosecution notwithstanding, never leave it without extinguishing the embers.

There are numerous good patterns of oil and spirit stoves, at prices to suit all pockets. Personally, I can do very well with a common stove burning methylated spirit (which latter I carry in a metal flask with a screw stopper). The "solid-fuel" stoves are also compact and fool-proof. With my outfit goes a round tin boiling pot, in which the stove reposes when not in use. To avoid the nuisance of flame flickering during a breeze, I take a folded rectangular screen about seven inches high, the angles of which are sharp-pointed wires that can be dug into the earth; this screen is high enough to keep off the wind, but not too high to prevent a frying-pan from resting on the stove. Do not forget a box or two of matches; the vest-pocket container type takes up no space at all, and keeps dry. Besides your pot and pan, you will want a light knife, fork and spoon, and should have loops in your rucksack into which they will slip; also a cup, saucer, plate and teapot. Little nests of bakelite pots are available, which are very convenient for taking butter, jam, sugar, &c. The teapot, by the way, is not essential, because one can use a tea-infusing spoon instead; but for more than one person a teapot is preferable, and it provides storage space as well. For many years I took an aluminium hot-water bottle, which weighed only an ounce or two when empty and held a quart. You should have a pocket-knife with a tin-opener attached, a tea-cloth and a small tablecloth; and that, apart from food, is very nearly the lot. A small shoe brush, polishing pad, toothpaste and brush, and hair brush, will all bed together very comfortably in an old sock. Arrange your things in the rucksack or knapsack so that soft and flat ones lie along the back, otherwise you will speedily be taught to do so by the sharp edges. I myself always use that position for my maps, which lie flat in the back, behind a flap.

Such an outfit as I have described, even including food, fuel and full water allowance, should not exceed ten or twelve pounds for each individual. If two or more people are going together, some slight saving is practicable; but in general it is always best to be self-contained.

As to food, if you are going for a week's or a fortnight's walk, it is stupid to take more than you need for a day or two (except rationed things, of course, about which there is no choice). The rest can be picked up from day to day. The pedestrian should live well but sensibly; he is doing a lot of physical work that demands plenty of food, but not too many sweets and certainly not too many sickly buns. These things are mentioned because they are the temptations which will confront you whenever you enter a shop! It requires a lot of self-discipline to put them gently but firmly aside, but it pays in the long run.

Clothes can be dealt with on the same lines as food. If, as certainly should be the case, you have planned out your route, send spare socks, handkerchiefs, underwear, collars, &c., to some convenient station, by passenger train; if practicable, yourself seeing that they really do go. Hand them to the guard, marked with the name of the owner, the station to which the parcel is to be sent, and the words " To be collected ".

Here is a simple hint about that common fault, leaving things behind at camping-places or picnic halts. The first thing to do when you have selected your site is to lay out the tablecloth upon it, and set up the stove close to the cloth. Having induced the cloth to lie flat with whatever loose stones or other objects are available, spread your outfit freely upon it *and nowhere else*; one can then hardly avoid taking them up again when moving on! This habit will save you a great deal of vexation, believe me.

We are now equipped. Where shall we go? What shall we do? The first of these questions depends, of course, very much upon the second. If you want just a carefree holiday, enjoying the scenery, the open air, the beautiful woodlands, the grand stretches of wild sea coast, the bathing in river and ocean, with which our favoured land abounds, then the matter is easy. Get a good map, of a scale one inch per mile, and plan your route upon it, measuring your distances between towns so that some twenty miles is covered each day; reckon that every third or fourth day you will stay in some particular locality for rest and in order to look about more closely. If, however, you have some particular aim, such as swimming, or boating, climbing, or insect-hunting, then not only must the right locality be chosen, and the right season be picked upon, but you will be restricted to that locality and will have to carry whatever special equipment you need, whether it be a killing bottle and

butterfly-boxes, a vasculum and paper for drying plants, or the quite special outfit of a mountaineer. Incidentally, although the carefree holiday is delightful, many people prefer the other sort, because it allows free play to their natural bent, and the joy of pursuing one's hobbies under such conditions has to be experienced in order to be fully appreciated. For such special expeditions, one naturally chooses a headquarters, e.g. if an entomologist, one of the little towns in the New Forest, and returns there each evening.

One of the wanderer's best friends is his map, but not all wanderers understand how to read a map, still less how to get out of it all the mass of information that a good map contains. We strongly recommend a 1 in. Ordnance Map, but this has the disadvantage that although it shows footpaths and a great deal of detail, the contours are not coloured. A ½ in. Ordnance Map shows the contours, the heights being in deepening shades of brown, valleys in varying shades of green; but the scale is too small to show footpaths in any detail (if at all), and minor bends in the roads seem straight on such maps. Messrs. Bartholomew's popular maps are reductions from the Ordnance maps and are also very good. Perhaps the best course for the novice in map reading is to make his first study from the coloured, small-scale variety, and then to work out on the road the peculiarities of the other type, where the contour lines are shown in red, but the contours themselves are not otherwise distinguished. The principle of the contour map is quite simple. Each contour-line represents all the points in the map which are at the same height above sea-level: 50 ft., 100 ft., 200 ft., and so on. If they are well spread out the slope is gradual, if close together the slope is sharp. The cross-sections, which show these facts, are constructed by drawing vertical lines to any reasonable scale at distances equal to the distances shown on the "Section Line"—AB on the map—taking one unit for 50 ft., two units for 100 ft., and so on (see fig. 1). In measuring the distances you may have to cover in hilly country, always allow liberally for sharp slopes; for there the horizontal distance, as measured on the map, may be 1 in., i.e. 1 mile, whereas the ups-and-downs may make it nearer 1½ miles in reality. On main roads, the gradients can also be deduced from the small figures marked on the map, which indicate the heights at "bench marks"; if one visits such a spot, one may notice there a small indicator—perhaps only a mark on a wall—looking like an arrow that points upwards to a horizontal line; this was

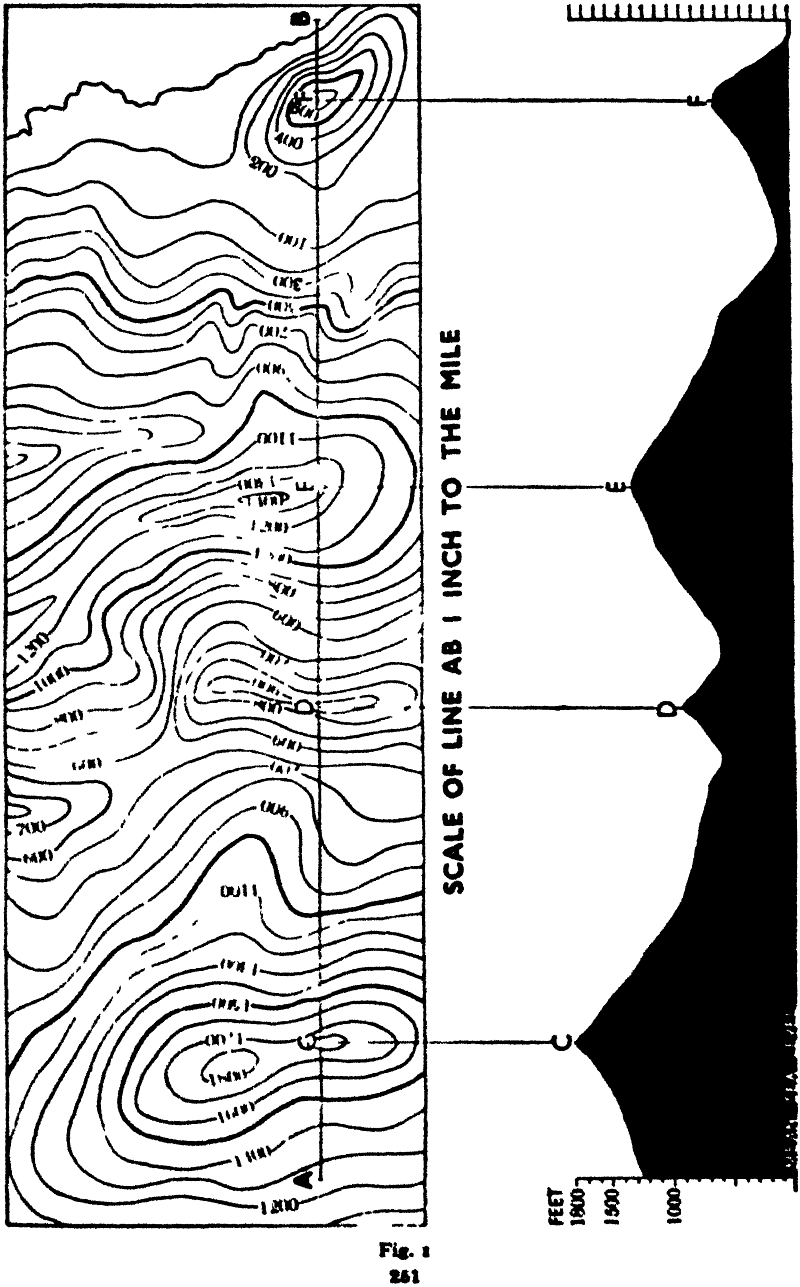


Fig. 1

made by the officers of the Survey when gathering data for the map.

On a long tour, where scenery is the main objective, mix your country; that is to say, try a little flat country, then a little hilly, then a stretch along some convenient river, then a bit of the coast, and so on. Some roads which on the map look promising are apt to be disappointing, particularly those along the tops of hills; because the view is often obstructed by some minor feature that the map fails to show. Only experience can teach you what type of country best falls in with your particular taste. In general, however, besides mixing the scenery, try parts of the map where patches of woodland are shown, and promising footpaths that lead up to the broken lines that denote a precipice, or down to the blue line of some winding stream. Boggy places are marked on the map and can thus be avoided before you find yourself entangled in them. On the other hand, every path is not a public path, and many minor roads merely lead to a private house or a farm; but it is not often that landowners interfere with people who are passing across their land, unless, of course, there is incivility or roystering. Notices notwithstanding, you cannot be prosecuted merely for trespassing; damage must be done, but picking flowers in a meadow constitutes damage (or so a local J.P. might consider it!), because if everyone picked flowers from that meadow there would be no hay.

To me the most delightful region for free wandering is along the sea shore, where one can sometimes go for many miles, partly up the cliffs and along paths that seem to be forever about to topple into the ocean below, and partly over the sand and small shingle at low water, or more painfully working a way through and over the huge boulders underneath the cliff itself. At such places, to possess a map is very comforting; for the air is so clear that places which are several miles away seem quite close, whereas a glance at the map tells us just what exertion must be made before we can enjoy ice cream and a rest in the next seaside town. When wandering alongshore, however, always keep an eye on the tide, or you may be shut into a bay between two headlands each of which is washed by deep water. Where streams tumble into the sea, usually running sharply down the beach from a deep pool behind it, take care; the water is sometimes deeper than it looks and can sweep an incautious wader off his feet. And if you do not want everything to be ruined by water, it sometimes pays to go back and round by the bridge.

The mention of water leads naturally to the question of rain, a question never far from the English walker's mind, even when larks are singing merrily in an almost blue sky. If the rain persists it is sound sense to take shelter. The lower part of a thick hedge over a roadside ditch is better shelter than nothing; barns and the under-sides of farm carts are better still, in the event of a sharp shower (and anyhow, one soon gets dry again); but best of all is to erect one's tent (if one has a tent), or to spread out the mackintosh horizontally over some branches, and there to weather the storm. Do not take shelter under trees. Thousands of people have been killed by lightning in that way; and yet people are so foolish that they continue this dangerous practice. On the sea shore an excellent shelter can often be found among the larger boulders, with one's mackintosh overhead, and the pot boiling in its little wind-proof frame; one can, in fact, there defy the unkind elements to do their worst.

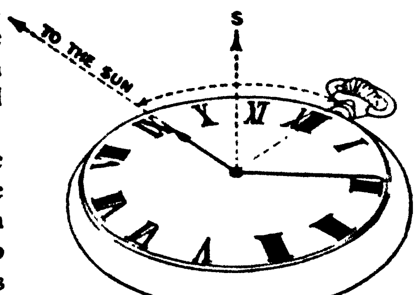


Fig. 2

If you are wandering in the woods, or anywhere else where your map cannot help you, a pocket compass—it need be no larger than a wrist watch—is most useful; in woods, particularly, one soon loses all sense of direction without a compass. Of course, the compass should be kept away from knives or other steel objects, or it will not read truly. At the side of your map you will usually see the lines of true and magnetic north marked; it is the latter towards which your compass points. Your watch can help if you have no compass and the sun is shining. Point the hour hand at the sun, and imagine the angle between that and the XII bisected by a straight line—that line runs approximately north and south; but do not forget to allow for Summer Time. (Fig. 2.)

One can get a general sense of direction at night, provided that the stars are visible, by watching the Pole Star. This time-honoured compassless aid to direction is found by tracing an imaginary line through the two outermost stars or pointers in the Plough (fig. 3); when facing it, you are looking almost due north; and, of course, the west lies on your left hand, east on your right, and south behind

you. There is a second aid to finding the Pole Star, which can be employed when the Plough is obscured by clouds. Almost opposite the Plough in the northern sky you will see a constellation that closely resembles an inverted W; this is Cassiopeia (fig. 3). By tracing an imaginary line bisecting the middle of the left-hand half of the W, you will pick up the solitary Pole Star, at just about the same distance as when that object has to be traced through the Plough. It is worth while to look at the sky sometimes at night, so as to familiarize oneself with these useful aids.

CAMPING

A camping holiday demands more kit, but it is better fun. There are few pleasures to equal the simple satisfaction, after a long day's toiling through woods, over rocks, or beside the majestic breakers

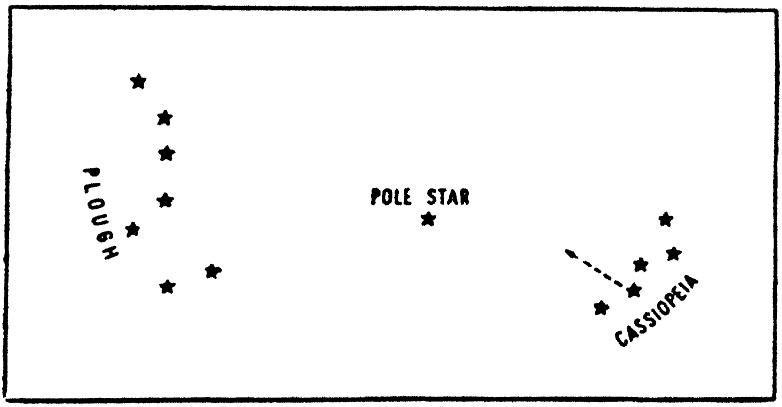


Fig. 3—Finding the Pole Star

of the ocean, of erecting one's tent just where one sees fit; of getting out the stove and sniffing the delicious smell of hot food that is cooking in the pot; of the warmth inside one after the meal, the sense of satiety, the darkening of the shadows outside, the curious silence of night all around; and then, as one draws the friendly blankets over one's head, the shutting out of world and shadows and everything until the next day's dawning. But to camp in com-

fort demands careful planning, besides thoroughness in fixing up the camp itself.

A wide range of tents is available, from the small bivouac tent that will just take one person comfortably, up to the voluminous, billowy affair which needs three or four hands to manage it. Personally, I favour the bivouac tent. It is all mine, I can do what I like in it, and if anything goes wrong with it I alone am to blame. True, I have to crawl into it; but the floor is stitched fast to the sides—an important detail—and is perfectly watertight; being luxurious, I have a ground sheet in addition. Two blankets will keep me warm on any summer's night; my haversack, with the

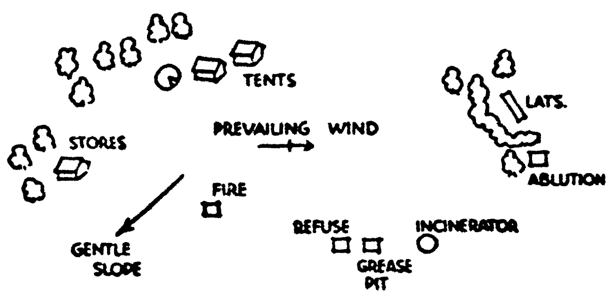


FIG. 4

soft items on top, makes an excellent pillow. (I once spent a most unhappy night through lying on a geological hammer, but that is another story!) Whatever type of tent is used, it is as well to get thoroughly familiar with it beforehand. Rig it up in the garden and picnic there; and by doing so more than once, the weak spots will gradually become apparent to you, and you will learn that no tents are perfect in all respects.

When pitching a tent, take advantage of the wind by starting the erection on the windward side and working down wind. A bivouac tent, at least, can comfortably be pitched beneath the shelter of trees, which, though cool in the day, is a warm spot at night. Always, when possible, get your tent out of the wind and on a dry site. Do not erect it on the edge of a swift-flowing stream with a bore, like the Severn or Wye, or a tendency to spates, like the Spey; or you may wake up to find yourself under water. In any event, the immediate vicinity of water means heavy ground mist; and this is

another reason for camping under a tree, where the mist is always thinner. A camp in a glade at the edge of a wood is perfectly delightful, provided that one takes the strictest precautions against fire. Of course, permission to encamp should be sought; as a rule it will be granted, if you make it clear that you will not start fires or leave litter about.

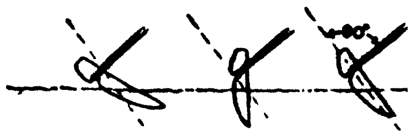
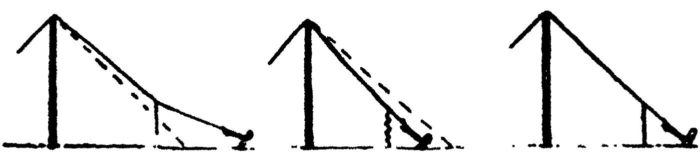
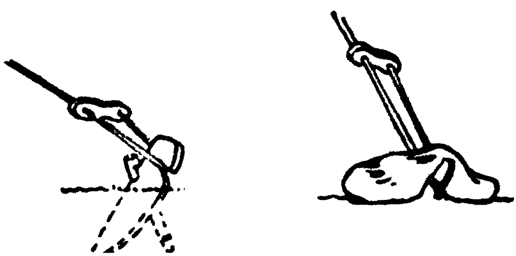


Fig 5.—Angle of tent peg. The right-hand peg is correct



Too far out — Too close — Correct

Fig 6.—Position of guys



Extra peg — Bag of earth

Fig. 7.—To ensure peg holding

Needless to say, tents must be thoroughly secured, even when planted in sheltered positions. Not only should the tent-pegs be driven well home, and the ropes made taut, but where the design makes it practicable, the edges of the fabric should be secured as well, by bedding them down and laying stones upon them. This is particularly important in exposed positions such as hillsides or ledges upon a peak. Nothing is more disconcerting even to the

strongest nerves than to lie in a tent under a gale, and to listen to its mad flapping, and to feel that at any instant it may carry away, with you inside, and be blown to the bottom of the valley. (Figs. 5–7.)

It should be equally needless to warn you not to light stoves within the tent, unless it be a large one. England is not the Antarctic, and such practices are quite unnecessary except in the mountains; nearly always outside shelter for the stove can be found or made, whatever the weather.

The confirmed camper is a creature of habit, who by long practice has learned to gather up all his belongings when he moves. Until the novice reaches that pitch of perfection, he will find a check-list of his outfit very useful, and should consult it regularly on breaking camp; for it is indeed maddening to stop for lunch several hours later and then to find that the frying-pan is still ten miles in the rear!

By the way, be careful of stream water, except for washing up; take your drinking water with you, making sure that you have an adequate supply each evening to tide you over breakfast. This and a thousand other little details will add both to your comfort and health when camping out. And—another "Don't"!—do not drink lots of cold water when you feel hot, or you will assuredly pay for it.

On breaking camp, unwanted paper should be burned and empty cans or bottles buried well out of sight; the ideal camper, like the famed Red Indian, leaves no sign that he has been there.

If you have any salt in your stores, put a label on it; tea with salt in it has such a peculiar taste! And some sorry messes have occurred because the lids of jars or bottles were not screwed home.

CLIMBING

Sooner or later the walker and camper, if sufficiently adventurous, develop into hill-climbers, and they may even become mountaineers; for up in the hills one really is away from civilization at last, and even on a fine day one soon learns that man has to battle with Nature for his very existence. How the wind howls up there! How it moans through the shrunken and trailing bushes, how it whistles round walls and hurls itself in sheer fury through some gap in them, such as a gate, as if it would topple the wanderer off his feet and drop him helpless on the trees below! Here in the hills we are face to face at last with the real Britain, beautiful, wild, stern

and untamed; and here we learn to take care of ourselves and our effects, in a way quite unnecessary to the modest hiker down below. The hill regions most frequented, I suppose, are the Cumberland fells, the North Wales mountains (particularly round Snowdon and Cader Idris), the Western Highlands of Scotland, taking Arrochar (on Loch Long) or Fort William (near Ben Nevis) as centres; the Eastern Grampians, with the mass of Ben Wyvis as a centre. The principal tracks up and across the hills are marked on the large-scale maps of the best guidebooks, and they should be followed without deviation until one has acquired some experience of that

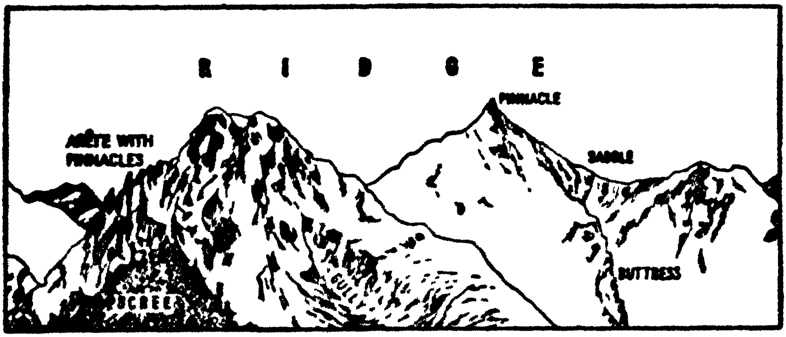


Fig. 8.—Mountain features

type of wandering. The chief perils to be watched for are mists, peat-bogs, precipices, and cold through exposure. However fine the morning, rain must be regarded as a natural accompaniment of high hills or mountains in our island, and only the very best "rain-proofs" will keep it out. Sudden mists are also apt to arise—less sudden, perhaps, if one has what is called "an eye for the weather", but still fast enough to envelop one in their cold, grey, wet arms before one has fully grasped the danger. Therefore, one must always be alert when in the hills. Salient points along the route should be noted deliberately, especially such as lie in a line beyond one another—e.g. a cliff, a perched boulder, a bush, or some detail of the ravine down which the adjacent brook tumbles; for these trifling details may perhaps come into view again when one is mist-bound, and thus point the road to safety. After a time, the habit of noticing such things becomes fixed, giving a much greater feeling of security, even in the most lonely places. Also, of course, the hill-man should have

a pocket compass. What to do when suddenly caught by mist while ascending depends very much upon the knowledge and experience of the party; the inexperienced certainly should not go on. If completely lost, stop and consider your position calmly and without panicking; and if still not certain what to do, stay where you are, but keep moving about so as to preserve your warmth. It is a fallacy to think that because the hillside slopes down through the mist, by moving downwards you must reach the valley; you may unexpectedly find yourself on the edge of a precipice, with a 50-foot drop, and above you slippery grass up which you dare not return: what then? If you have been descending a ridge, and know your general course, it is still—in most cases, at least—inadvisable to take the sharper slope that leads to the unseen but noisily brawling brook, for down there are not only all sorts of stones and rough ground, but almost for a certainty patches of bog, into which the unhappy adventurer goes thigh-deep at the first step. The ridge, on the other hand, is necessarily hard ground, and it must lead you down in the end.

So much for mists, the arch-enemy of the hill wanderer. Bogs are easy to detect, but must also be treated with respect; it is better to go round one than try to venture across it on tussock-grass. You will find them on all parts of our rain-soaked mountains, and not merely in flat bottom-lands. In the Highlands of Scotland there are many deep peat bogs in the inwardly curving parts of the upper slopes, and even on flat summits. Cotton-grass moors are commonly bog-moors; but heather-moors are dry.

We will deal with precipices in a moment. As to cold, it is to be dreaded and avoided even more than mountain mist; for its numbing effects will weaken the hardiest mountaineer, depriving him of the power of thinking clearly, and may even land him in serious danger of frost-bite or worse. Obviously, therefore, if bound for the hills one must be warmly clad; woollen underclothing, woollen socks, woollen gloves, and warm Scottish homespun tweed clothes. (You may not know it, but snow-beds lie on Ben Nevis sometimes for several years on end, unmelted, so that real cold in Britain is no imaginary thing.) Equally important with these things is to have sound, waterproof footgear. Strong, but soft boots, with a few nails in them for gripping the slippery rocks, are advisable on all hill tracks, for up there many frost-riven stones will be found, which have edges as sharp as a razor, and sides as slippery as glass.

Hob-nails in groups of three all round the edges are quite sufficient for a general-purposes boot. If you intend to do any climbing on dry rocks, a pair of soft canvas shoes tucked in with your kit will come in useful.



Fig. 9.—Rock-climbing. The roped leader on an exposed ridge

If your aim is to spend a few days camping on high ground, it is vital to see that your tent is adequate, made of good quality proofed canvas, with side walls on which rocks can be laid, and with good sound guy-ropes. As you may become weather-bound, and have to do all your cooking within the tent, a Primus stove is recommended.

Naturally, except under compulsion, one does not camp under the lee of a cliff, lest the wind (or somebody scrambling about overhead) should discharge a shower of stones on one's head.

It commonly happens that, after a good deal of toilsome scrambling up some half-obliterated hill-path, one finds oneself under the peak proper, and in a sort of amphitheatre, with steep and very slippery walls; a mountain tarn usually nestles at the foot of the



Fig. 10.—The leader. A good stance and belay



Fig. 11.—A good belay for the second man on the rope

cliff. Such corries, as they are called, are interesting reminders of much wilder times in our island's history, for glaciers once had their heads in them, and it was the backward sapping action of the glacier which created the gaunt cliff. Here you may try your luck at rock climbing (see figs. 9–12), though you will probably come to the conclusion that it is much easier, not to say safer, to ascend the mountain by the ridge.

Climbers are born, not made; but any agile youth or young man, with a reasonably steady head, can indulge in this delightful sport, especially if he makes his first attempts under the guidance of an expert. The desire to get up a cliff or a mountain by hook or crook, though very natural, is often a hazardous business, which

may land a man in peril of his life. Whymper, the famous conqueror of the Matterhorn, used to declare that the most dangerous climb he ever made was when he and his brother, as youths, tried to ascend Beachy Head. All will be well with you, however, if you never forget that the aim of mountaineering is to ascend mountains *and return safely*; that is not so difficult in this country as in some places, because as a rule one must go out of one's natural route to make the climb at all, and a wide choice of descents is generally available. Also, one must be content to learn slowly, and not tackle faces of rock which are beyond one's powers. Until they are experienced, climbers should always go out in pairs. There are numerous climbing clubs, to one of which the novice should attach himself, and these facilities, which are linked up with the Youth Hostel movement, will provide a keen beginner with opportunities year by year of improving his technique. A list of these bodies is given in the very valuable little handbook, *Climbing in Britain*, by J. E. Q. Barford and others, which has recently appeared in the *Pelican Books*. This volume goes so fully into methods and equipment that it would be redundant to enlarge on the matter here. It should be noted, however, that climbs of every degree of difficulty, from an easy scramble up to an almost impossible precipice, are to be found on our cliffy southern and western shores. When attempting such a climb, always map out your route beforehand; and if you cannot see your way to the top, stay on the beach! To *descend* sea cliffs is always hazardous and is sometimes sheer folly; because there is often an incurving face, created by the tide, which makes the last ten or twelve feet of the descent impossible without a rope. Another point to be watched when scrambling about on sea cliffs (as on other cliffs in most districts) is the security of one's handhold and foothold. Ledges which invite a foot to rest upon them turn out to be decayed and rotten under pressure, yield without warning, and unless the climber has his other extremities firmly secured a breakneck fall may result.



Fig. 12.—The leader; legs doing the work, not arms

Climbing in general is not so dangerous as it looks from the remarkable photographs of experts ascending, like cats, some outbulging and seemingly creviceless cliff. There are usually ways up to be found, by patience and the risk of a little damage to one's attire; but if it is necessary to return on the line of ascent, then the ascent should not be made by novices unless they find it quite easy and comfortable; for it is somewhat of an experience to come down a cliff, especially if (as is preferable, on the whole) one comes down facing outwards. The whole technique of the craft is contained in three words, Balance, Rhythm, and Confidence. Except on severe climbs, it should rarely be necessary to haul oneself up by one's hands; places should be sought where the feet, or the nailed toes of one's boots, can obtain sound purchase, and the weight of the body should be taken on them. Never get "spread-eagled", or flat up against a cliff, with hands and legs both outstretched, or you will assuredly have a fright before you recover your balanced position! On all severe or dangerous climbs, parties ascend roped together, and the most experienced climber goes first; this is a special part of the craft and outside our present scope; similarly with all work on snow slopes.

By the way, it is not advisable to stand on the edge of high cliffs upon a windy day; lives have been lost through over-confident people being blown over by a sudden gust. The caution may seem unnecessary, but so are many other climbing hints; unfortunately, however, it is neglect of these obvious and simple precautions which has time and time again in the past led to dreadful accidents. Climb hard, climb boldly, but climb safe.

Many people suffer from giddiness when looking down from a cliff top, still more so when contemplating the street from the top of a skyscraper. This occurs primarily because they subconsciously feel off balance, i.e. unsafe. When walking on level ground, or rising or descending a moderate slope, one's eye takes in the ground a little way ahead, and the natural balance of the body on the legs is corrected by this "invisible third limb". But when we look out into space, or down at a beach five hundred feet below, and see people like ants moving about down there, the "third leg" has gone, there is nothing to take its place, and a tendency to pitch forward sometimes results. By training and persistence this weakness can usually be conquered. Let the eye take in some point on the cliff, a short way down, and then consider mentally, "It is only so

many feet to that point". Then pick up some distinctive mark below, and so on, arguing to oneself that the whole distance is merely made up of these small parts; in time you should become completely indifferent, like the sailor who so agilely mounts to the main truck on a battleship's mast, 180 feet above the steel deck. But if, despite such training, you still suffer from giddiness when on heights, you should give up the sport; for such a climber is a danger, not only to himself, but also to anyone to whom he may be roped.

CAVE-HUNTING

Mention of sea cliffs brings us naturally enough to those mysterious, often yawning black cavities, green-stained, lined by weeds, into which the sea pours at high tide and out of which it tumbles at the ebb, leaving slippery green slabs and a treacherous floor of water-filled holes; the sea caves, resorts of smugglers from time immemorial, but yielding to the inquisitive traveller to-day only a few bits of driftwood, perhaps a dead bird or two, and a pungent smell of decaying seaweed. You approach them with awe, clambering over the great boulders which some Titan long ago laid by the entrance. You find, newly exposed by the receding tide, a sort of track, up which you make your way, and in an instant you have stepped out of the warm sunshine into cold, sepulchral gloom. Here, as in other caves, a strong torch and a length of rope may come in useful. The path, if path it be, leads into a vast chamber; the roof may be dry, but the wall, to which you are compelled to press your body in order to avoid tumbling into the sea, is wet and clammy—no place this for one's best suit of clothes! Yet the spot has romance, perhaps a real history. Up this path, not more than 150 years ago, men toiled with kegs and cases, transshipped from a lugger to a small boat that lay rocking near the entrance; the men were guided by lanterns, but they knew their way only too well without one. Other men meantime were posted out on the beach and even on the cliff top, to give a warning, by whistle or flash-light, should the hated coastguards appear. Where did the kegs go? Toilfully we trace their route, not noticing how small the patch of light that marks the opening of the cave has become, or how it vanishes at last because we have rounded a bend. At last the wall comes down to meet us. There is a strip of sand, the edge of a pool,

and bare rock; No! there is a crack on the left, through which we squeeze. (How did they get the casks through here?) We play the light upwards, and find to our amazement that there is a big crack overhead, through which we can just discern the daylight. Scrambling excitedly up a sort of natural staircase (in which our strong imagination can still see the wet imprint of the smuggler's boot), we reach earth, we touch grass, and with a consciousness that if we slip we must break our necks on the rocks forty feet below, we haul ourselves up and emerge in bright daylight above the cliff. Close by is an ancient cottage, obviously once the storehouse for the smuggled goods! A jovial-looking rustic is leaning against the wall, contemplating nothing in particular; we interrogate him, and are told some most awful lies about the cave and its story. A shilling changes hands, we return to the beach by the normal route, and our new friend, having replaced his deeply bronzed hands into his nautical trousers pockets, waits patiently for another victim.

Such caves abound in Cornwall. There are also fine specimens in the chalk cliffs of Yorkshire and Kent. Many of them are closed at high water, so always notice the state of the tide if you don't want to be shut inside for twelve hours.

Another kind of cave hunting is far more venturesome and even eerie. The limestone hills of Derbyshire and the Pennines, the Mendips, and some other parts are literally seamed with caverns that vary from mere holes up to huge cavities sixty or seventy feet high, connected by a tortuous maze of passages, sometimes many hundreds of yards long. They are all due to solution, the lime having been dissolved by carbonic acid and carried away in the streams. In such country as this, it is no uncommon thing to find a brook (or beck) suddenly tumble into a hole, burying itself in the ground; one may hear the water thundering away down below, but cannot trace its course except in dry seasons, when the beck has dwindled to a mere runnel. The great majority of these spots are well known and are frequently descended by such bodies as the Yorkshire Rambling Club; scientists have also thrown dyes into the water, which others waiting down below have watched emerge, perhaps after a subterranean course of more than a mile. In dry seasons, one can take a rope ladder, descend the sheer face of the fall—a somewhat fearsome job at the first essay—and walk, crawl, or scramble into the heart of the earth, until at last the water which is everywhere gathers itself into one final pool that there is no pass-

ing. The weird nature of such places, the glorious colours of the stalactites which hang from the roof, and of their "other halves", the stalagmites which arise from the floor, the vast caves with roofs so high that the beam from one's torch cannot reach them, the "narrows" where one has to crawl on one's stomach, exceedingly conscious that if the earth were to slip one would be crushed flat: all these things lend a special delight to cave-hunting. Try it. But do not try it alone.

RIDING

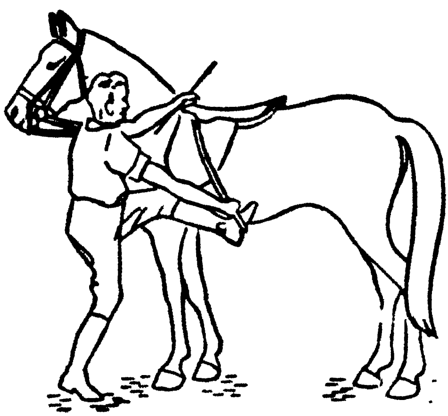
There is something about riding which captures the hearts of all young people, and so makes them and their ponies, and later on their horses, friends for life. Most boys have a spirit of adventure, and all boys of spirit like to feel they are in a position of authority or command. On the back of a pony, a boy does enter the field of adventure, and certainly, before he has had many days in the saddle, he will find he is acquiring the rather grand feeling of mastering his pony and being able to control and guide for his own pleasure a lovable animal, very strong and sometimes rather wilful, but in a funny sort of way, and if well treated, anxious to be ordered about and controlled.

Now, before I start to give you advice on how to ride, groom, and feed your pony, let us first see the chances of your being able to afford to ride, for there are not by any means more than a small proportion of boys whose parents have nice, roomy, well-built stables, with grooms to do the work and bring the pony round to the front door, beautifully "dressed", as we call grooming, and with saddles and bridles burnished and polished like those of a Lifeguardsman.

Most boys have to look for their riding at Riding Stables. Fortunately, there are hundreds of these, all over the country, and the boy who cannot get to one of these, by bicycle, bus or train, must be unlucky enough to live in a fairly remote part of the country. Some of these stables or riding schools are good, but most of them, I am sorry to say, are rather poor, and by this I mean that the amount of riding that can be learned is small, and at many the tuition is wrong. Let me tell you now, that it is absolutely necessary for everyone to be properly taught, for most accidents result from the rider not having been taught to have a firm, well-balanced seat, with proper control. The pony's well-being and comfort come into this also.

It will seem to many of you that to own a pony of your own is something that exceeds your wildest and most delightful dreams; but most ponies can be kept at grass all the year round, and only

require extra feeding in the few severe winter months, and what is more, they are better in health for being out all the time. You will see, therefore, that if a reasonable-sized field is available, the cost of keeping a pony is very small. Remember, too, that ponies can eat all sorts of things, besides hay, grass and corn, but more of this later. A pony need not cost much, and its value depends on breed, on age, temperament, manners, and what we call conformation, and above everything, soundness. Conformation, by the way, means the correct shape of head, neck, body and legs, and how each fits in and forms part with the others.


Fig. 1.—Mounting. First position

Now let me give you some simple instruction in riding. I shall have two things in mind, the first being that you shall ride correctly, and the second, that you shall ride safely. Actually, if you do the first, then that alone will teach you to ride safely. It is altogether wrong that so many accidents should result from people riding, and most of these can be avoided if the rider is taught properly. Ride all the different ponies and horses you can. It is in this way only that great riders are made.

Any way to mount a horse is the correct way, provided it is done with safety to the rider and comfort to the horse. It follows, then, that it is best to mount from a mounting block or any such aid to the rider, so as to prevent that dragging over of the saddle which so often happens. There is no better way for horse and rider than a "leg-up" for the latter, but an assistant is very often not available. Let us, then, mount in the usual way, from the ground or a nearby block, as follows. Gather the reins in the left hand, which should be placed on the pony's neck, just in front of the saddle, and let the near or left rein be a little tighter than the off or right rein, for the reason that if your pony moves forward he will tend to turn round towards you, giving you more control over him. If he has a mane, take a nice lump of it in the fingers of your left hand.

Turn your back to the pony's head and face his tail, raise your left leg and put your toe into the stirrup iron, which is then held by the right hand to help in the left foot. Place the right hand now on the *front* arch of the saddle (the pommel), *not* on the back (the cantle) as is usually done, and spring lightly and actively off the ground with the right foot, turning in the left foot and pressing the left knee into the saddle. This will bring both legs off the ground and the right should be swung over the saddle, into which you should drop as lightly as you can, at the same time putting your right foot into the right stirrup. Remember, stirrups always hang down parallel with a pony's side, and the right foot should be turned into the right-hand stirrup and when in, both feet should then be turned outwards.

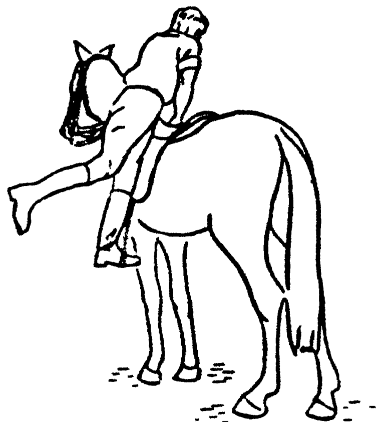


Fig. 2.—Mounting. Second position

I will pause in the instruction for a moment to tell you why you should put your hand on the *front* of your saddle. If you hold on to the back, as nearly everyone does, to pull yourself up you draw the saddle towards you and displace it, thus rubbing sideways the hair of the pony's back, and also, as soon as you are off the ground, you have to move your right arm to get it out of the way of your right leg, and this is clumsy, awkward and incorrect. You will be counted as a knowledgeable and correct rider if you follow my advice.

What I am about to tell you now is the most important part of riding, for this is where the safety comes in. Do not run away with the idea that you should ride only by balance, as some people may tell you. It *is* possible, but you are asking for trouble if you do so without grip, which is the rider's great safety catch. And do not believe people when they tell you that to grip is exhausting to both rider and pony. It is neither. A pony can dart to one side or turn round so incredibly quickly that the best-balanced person in the world cannot possibly remain in the saddle. But a good grip, applied to a knee properly put on the saddle, can keep a rider safe and sound. Very well, you have dropped into the saddle. To get the right posi-

tion (you won't need to do this after two or three times), take your feet out of the irons, and sit well forward, right on what we call the "crutch", and hang the legs straight downwards, now draw the knees upwards and inwards, and the lower part of the leg from the knee downwards slightly backwards, so that the heel is behind the saddle girth, sit up straight, look up and in front of you and hollow the back slightly. That is the perfect seat. It needs a little practice, but you will get it in a very short time.

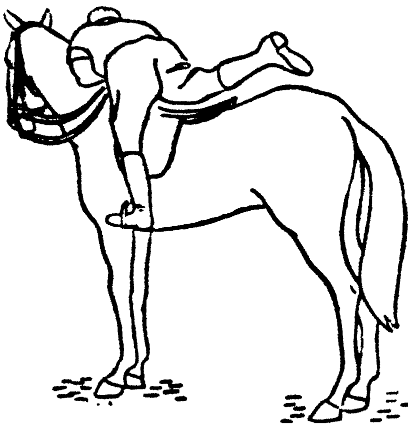


Fig. 3.—Mounting. Third position

Here is the best tip I know for acquiring this much-desired grip. Just imagine that there you are, in the saddle, which is placed in the middle of a great clock face. Imagine, again, that you are looking straight ahead at 12 o'clock. Point your left toe (which should just be seen by you sticking out beyond your knee) to about 7 minutes *to* 12, and your right toe to 7 minutes *past* the hour. Keep the knees bang on the saddle, turning them in ever so slightly, and draw the legs outwards and away from the saddle somewhat, not too far, and always keep the heels down. Try this at home, without a saddle, just standing on the floor; try it now, as you read this. Can you feel the grip running right down on the inside of the thigh, and the knee gripping tight? After a while this will be no effort at all; it will become quite automatic. Actually, you will not be gripping actively; it will be the position of the knees, legs, feet, and heels, all doing their part.

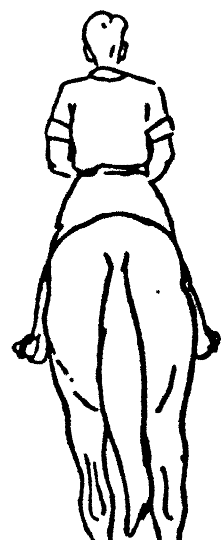


Fig. 4.—Correct seat

While you are in the early stages of riding, you will find it better to put your foot "right home" in the irons, otherwise you will be

losing them frequently, and you will not feel safe. Later, ride with the ball of the foot (the part just in front of the instep) on the stirrup iron. Here is a neat way to find your seat in the saddle, which you can try at home. Sit well back in a chair, and get someone to pull it from under you, and be careful, for you will find yourself on the floor! Now, sit farther forward, until you are sitting right on the edge of the chair, and draw your heels under the chair. When you are in the right position, anyone can pull the chair away, and you will, in your imagination, be standing in the stirrups, and not sitting on the floor this time, and *that* is the correct position in the saddle.



Fig. 5.—Position of knees and hands

We must now get on with the reins and how to hold them properly. If you are riding with single reins, they should be passed round the outside of the little finger of each hand, and each rein should pass out between the first finger and thumb. The knuckles should face inwards, with the little fingers on the lower side. The reins should be held lightly, and not gripped by the fingers. The hands, with the fingers and the wrist joints, should be supple and flexible, and the arms should hang lightly to the sides. The shoulders should be straight and square, and the back slightly hollowed, with the head up and looking forward.

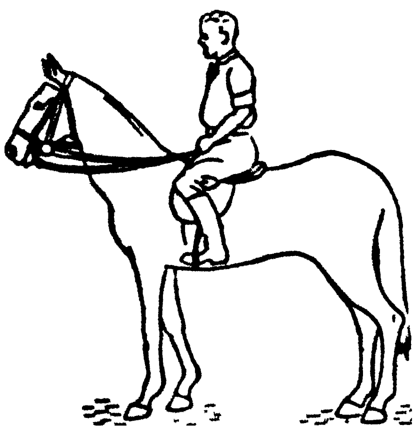


Fig. 6.—Standing still

If two reins are used, as in the case of the double bridle, the top (or bridoon) rein should be outside the little finger, with the curb (or bit) rein passing between that finger and the next, and the two reins should pass out upwards between the thumb and forefinger as before, the same procedure

applying, of course, to either hand. Always ride with the knuckles inwards—not downwards, with the palms turned towards the ground, which is riding puppy fashion!

It will be a long time before you ride really nicely, make no mistake about that, but if you sit and grip as I tell you and follow these few hints on how to ride the three gaits, you will get along all right. To walk, sit easily, as instructed, and sway, or give your body to the movements of your pony. To trot, you must catch the rhythm of your pony's movement, and rise at the beat. You simply will not be able to do it at first, but you will hit it quite soon, and once you have got it, you will never really miss it.

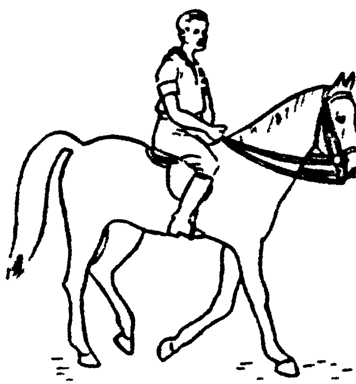


Fig 7.—At the walk

To canter—and this is the most difficult of *all* the gaits—aim to sit down well in the saddle, and work yourself into the movement; and the gallop is the same, only faster.

Always, at all gaits, sit a little forward. Remember sitting on the edge of the chair, and then you will get it. And remember also at the trot, to try always to come down on to the saddle in such a way that you just touch it, and then, up you go again. Don't bump at the canter; it is difficult not to do so at first, but you must try hard. In other words, do not flop.

The correct position to hold the hands is just above the front of the saddle, and for real beginners even a little lower. The reason for this is that a learner is constantly getting unbalanced, and when this happens the tendency is to lift the hands and then the balance gets even more out of place. You must aim to have a light feel on your pony's mouth and never to hold yourself in position with the reins. Not easy, this, but it will come in time if you keep the correct position—knees in, lower legs back and a little away, with heels down.

The best thing that can be said of a rider is: that he rides *below* his weight, whatever it may be. This means that he rides lightly and easily. If you ride in this way, you will find as you progress that you will not need to hang on with the reins, and therefore you will

acquire good hands through having a good seat. But you *must* use your legs from the knees downwards. A pony should always be balanced when he is being ridden, and this means that his head must be carried correctly, and his hind quarters kept under him. To do this, the calves of the legs or heels, if the pony is a little unresponsive, must be pressed into his sides, slightly behind the girths, and his head brought in a little and raised or lowered as may be necessary. This getting the pony balanced may have to be repeated a number of times during a ride. There are other things which may well be done to improve a pony's carriage, but space is not available to go into this more fully.

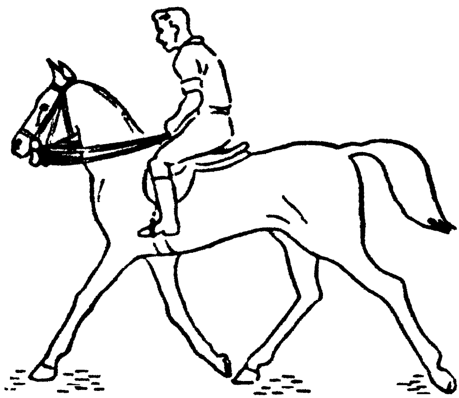
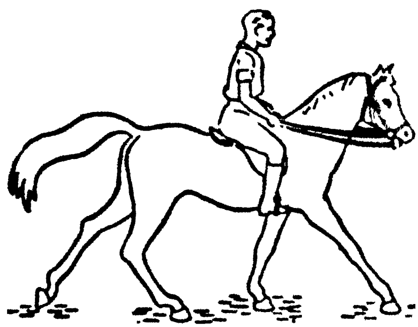


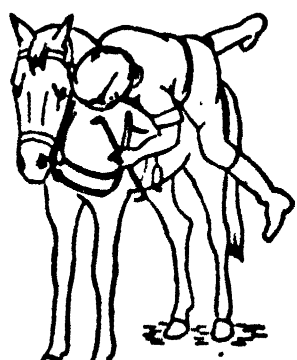
Fig. 8.—At the trot

We must have a few words about grooming and stable-management, for no boy can call himself a horseman unless he knows something of this and practises it; but before doing this I had better tell you how to dismount. Take the reins in your left hand only, and hold the front of the saddle with the same hand. Take the right foot out of the stirrup iron, lean forward a little and swing the right leg over the back of the saddle and bring it down to the other leg. Hold back of the saddle with the right hand and take the left leg out of the the stirrup iron and drop lightly to the ground. Another way is to take both feet out of the irons, throw the body forward, hold the left rein only, and as the body goes forward, with the head even below the line of the pony's neck, run the left hand down the pony's left shoulder, and at the same time swing the right leg over the pony's back and bring both legs to the ground in the order left-right. This is a good way to dismount, for should the pony move on, you will be walking or even running with him.

A good stableman is neat, tidy and clean; he keeps his stables clean, and feeds with thought and at regular intervals. A pony has a very small stomach and, like a horse, should be fed three or even

four times a day—first thing in the morning and late in the evening; but you needn't do it at 6.30 a.m. or go out at 9 o'clock at night! The great thing is to do it regularly, and fit in all meals to suit your convenience. Ponies, if they are of the "Native" breeds or Mountain (or Moorland types as we call them, Exmoor, Dartmoor, New Forest, Fell or Welsh, are better kept out at grass, day and night, winter and summer, and if there is plenty of grass, they will need hay only in very severe weather. If stabled, hay and corn (but not for ponies) and bran are the ordinary foods, but remember, ponies enjoy and do well on potatoes, turnips, swedes, mangolds, carrots, and practically all sorts of household scraps and "roughage", bread crusts, potato peelings, and so on. If a pony eats up his meal, looks well, and is willing and anxious to work, you can be sure you are feeding him satisfactorily. Corn should not be fed to ponies. It is very like strong drink; it often goes to their heads, and gets them into trouble, and their riders too! If at grass, they should not be groomed, as we understand it, but merely have the dirt brushed off, then ridden out. What lies behind this is a certain amount of protection against wind and rain. If stabled, the pony must be groomed. Brush off all mud with a dandy brush, and afterwards go over body and legs with a body brush, and finish off with a stable rubber or cloth. To groom the near side, hold the brush in the left hand and work from the head, down the neck, along the body and down to the tail, and finish off with the legs and head. Use long sweeping movements, and stand balanced and looking slightly towards the tail, with the right arm raised and outwards for balance.


Fig. 9.—At the canter


Fig. 10.—Dismounting

Repeat the same on the off side with the brush in the right hand. When working with the body brush, hold the curry comb in the free hand and use it to draw the body brush across the teeth to clean the dirt and scurf from it.

Water should always be at hand in the field, and if the pony should be stabled, he must always be watered *before* his meal and never after. It is perhaps better to leave a bucket of water in the stable, but see that it cannot be kicked over. I could write a lot about feeding, grooming and stable management, but the space is not available. I would just say that if your pony is looking well covered and is bright in the eye, is a willing worker, and seems to enjoy his life and eats well, you have nothing to worry about.

Almost without exception, every good horseman I have known not only keeps his saddle and bridle clean and well polished, but his boots also, and his clothes and hat well brushed. Always dress neatly, and although you can have a bit of colour about your jacket and tie, fasten up the one and pin down the other. Always wear a hat or cap—real horsemen always do. Saddles and bridles, even when quite old, can be made to look and *feel* really grand. The great thing to remember is always to wash off the dirt and sweat with a damp sponge; it is important to remove *all* the dirt, otherwise you will not produce a nice bright finish to your leather. Then apply saddle soap. Every strap should be taken out of its buckle, and these and the bits and stirrup irons should be polished with metal polish, the whole hung up in a dry place. Girths should be washed from time to time, and the lining of the saddle, if linen, well brushed.

This must be the end of my little talk. Horsemanship is a great accomplishment. You can spend a lifetime at it and still go on learning. It is highly skilled, and yet those who know only a little about it can get great enjoyment from it. It is a man's game, if ever there was one, and it is great for building up a firm character. For some reason, people have always looked up to the rider in a strange sort of way, and a boy or a man is sometimes described as "a good horseman", meaning that he is something rather special and to be admired. I have ridden all my life, hunted and played polo, and I cannot imagine that any greater pleasure can be had in this world. Many hundreds of years ago it was written, "Happy is the man who rides a hundred horses", and so I will end by hoping that *you* will ride that hundred and many more besides.

RUGBY FOOTBALL

Many have found interesting entertainment in tracing the origin of football. It has led them as far afield as Greece and Rome. For our purpose it will suffice to know that Rugby had its origin at the famous public school of that name, and owes its characteristics to the untoward action of a pupil, William Webb Ellis, who, contrary to the rules of that time, picked up the ball and ran with it. What caused him to do so is not known. He may have had an inventive brain, and had visions of raising the standard of play from a kind of all-in wrestling match to a scientific basis, or it may just have been instinct. Whatever Ellis's motive, the act on that memorable afternoon in the year 1823 imprinted his name indelibly in the annals of the Rugby game.

In the beginning its effect was not properly understood, and it was nearly twenty years later before the Rugby School laws recognized and allowed a player to run with the ball in his hands.

Development of Rugby Football.

Before passing to the development of the game it may not be out of place to devote a few lines to the methods employed. Teams of specific numbers such as we have to-day gave no concern. Men formed up on either side—there might be fifty or more—and when the ball was set in motion endeavour was made to force it through serried ranks. They did not scrummage, that is, as we know it, but remained upright and used every known means to effect a passage to their opponents' goal. In stopping them hacking and tripping were quite legitimate means of bringing a player to a halt. There were few rules, but it was in order for a player to pass back, provided the ball was kicked forward. It was in this respect that Ellis's action came as a bombshell and gave the Rugby game its distinctive character. To score goals was the prime object. For a long time tries were of minor importance. They merely gave the attacking side a chance to kick a goal. That is why old records accord victory to a side that scored, say, one goal and one try against three tries. At that time a field goal, a drop goal, and a penalty goal or a placed

goal were of equal value. With the advent of points different types of goals were graduated and tries given a more important place. There is not space to deal with the changes that have taken place. Suffice it that at present a placed goal counts five points, a try three points, a penalty goal three points, a goal from a mark three points, and a drop goal four points.

While this was happening the game was advancing from its crude state to a semblance of uniformity when the Rugby Union was formed in 1871. This same year England played Scotland at Raeburn Place, Edinburgh, and lost, but not without protest. From a scrum at five yards the Scots drove the opposition over the line and grounded the ball. England claimed that as the ball had not been on the ground in the initial stages the action was illegal. The umpires upheld Scotland, but it appears that they did not know clearly what the trouble was about. What was obvious, rules differed in the two countries, and they were never satisfactory until the International Board was formed in 1890. Trouble arose in 1886 over an alteration made by the Rugby Union. The other Unions had been approached, and would neither say "yes" nor "no", but when the altered rule was put into practice they intimated objection to its validity in International games. At this date it all seems petty, but no doubt all were very jealous of prestige. Anyhow, it caused a hiatus, and no games were played during the years 1888 and 1889 between England and the other home countries. Reason came to the rescue in 1889, when the Rugby Union suggested arbitration and the offer was accepted. Lord Kingsburgh and Major Marindin, who had done so much to advance the game in their respective countries, Scotland and England, were appointed officers and gave their decision, after meeting in 1890, as follows:

International matches shall be played under one code of laws.

The International Rugby Football Board shall consist of twelve members, six of whom shall represent England, two Scotland, two Ireland, two Wales.

The Board shall have power to settle all disputes arising at or in connexion with International games, by a majority of these members.

The Board shall have power by a majority of not less than three-fourths of their number to amend, alter, or cancel any law in the International code, or to add to it.

The judgment of the arbiters found ready acceptance and must be written down as one of the major landmarks in the game.

In the first International referred to there were twenty players on each side, thirteen of them forwards, and the duration of play was 50 minutes each half. By 1877 the number was reduced to fifteen, nine of whom were forwards. This change served to develop back play, and soon Wales were experimenting with four three-quarters. It was not, however, until 1893, when the Welshmen won the International Championship for the first time, that the formation became acceptable to all. This was perhaps the most revolutionary change the game has ever known, because it altered underlying principles and made backs the spearhead of attack.

Since then New Zealand has gone a stage further by reducing the number of forwards to seven, but in the main the present formation in all countries is eight forwards, two half backs, four three-quarters and one full back.

Essentials for the Game.

In playing Rugby one takes it for granted that facilities for doing so are available. Once a playing field has been secured the first essential is a ball. It is of oval shape, and in match play should conform as nearly as possible in size to 11" to 11½" in line, circumference through minor axis 24" to 25½", and weight 13½ to 15 oz. Many no doubt wonder why the ball is made oval. To get a solution one has to go back to the days when footballs were made of a pig's bladder encased in leather. Naturally they varied considerably in shape and size, but they were more or less egg-shaped, and this form was found to give the best results when dropping and kicking. However, the beginner need not be fastidious about either the shape or the weight of the ball. One which has been in use for a long time and has become less pointed is ideal for practising dribbling and passing.

The next, and a highly important thing, is a pair of well-fitting boots. Some players prefer studs, some bars on the soles. This is a matter of taste perhaps as much as anything, but it is imperative that the uppers fit tightly. When purchasing, therefore, never select a boot that the foot slips into easily. A gap of at least an inch should be observed between latchets when the boot is tightly laced the first time. This is not too much. Weather and play will reduce the gap quickly, and bulges and lurks will not appear above the

ankles. Nothing is so detrimental and annoying as boots which move one way, the feet another. Having got good boots, look after them. Following match or practice, do not stow them away in a bag and leave them there until the next play day comes round. Treat them well, scrape all mud off the studs or wherever it is adhering, and feed the leather with dubbin. This will prolong the boots' life and make them a joy to play in. Before turning out see that the laces are sound and strong. Never be without a spare pair.

Plan of Field.

Being now prepared, it is essential to have a knowledge of the field of play (fig. 1), for within its limits skill and physical strength in happy blend must be exercised to outwit the opposition. It is no mere accident that a boy becomes a great forward or back. It is the result of intimate knowledge of the fundamentals, coupled with an active brain and co-operation with his fellows. Once this fact has been grasped the road to progress is open. At this stage specialization should not be countenanced. No boy should be called on to fill a particular rôle until he is complete master of all details. The tendency to make big lads forwards merely because they are big shows an ignorance of the niceties of the forward game, and it is crass stupidity to make one a wing forward merely because he happens to be a fast runner. In early years boys should play in different positions, even though they show signs of being better suited to a particular place. In short, all taking part should have a full knowledge of underlying principles before putting them to the test in match play. Again, all boys whenever possible should make a point of seeing first-class Rugby. Problems which have puzzled are often solved by watching the great and experienced, and it is doubly valuable, if a games master is in attendance, to point out weakness and strength as they develop from particular movements. There is nothing haphazard in Rugby. There is some good reason for every single act, although it is not obvious to everyone.

To start the game the ball is kicked off from the centre and must travel at least 10 yards ahead. This is perhaps elementary; but how many ever consider that there is tactical advantage to be gained by placing it in a particular direction? To get the game going is usually the only thought. Instead, the kicker ought to consider how his side can profit. Now it is well known that 90 per cent of those who play Rugby can kick with only one foot effectively and that the right;

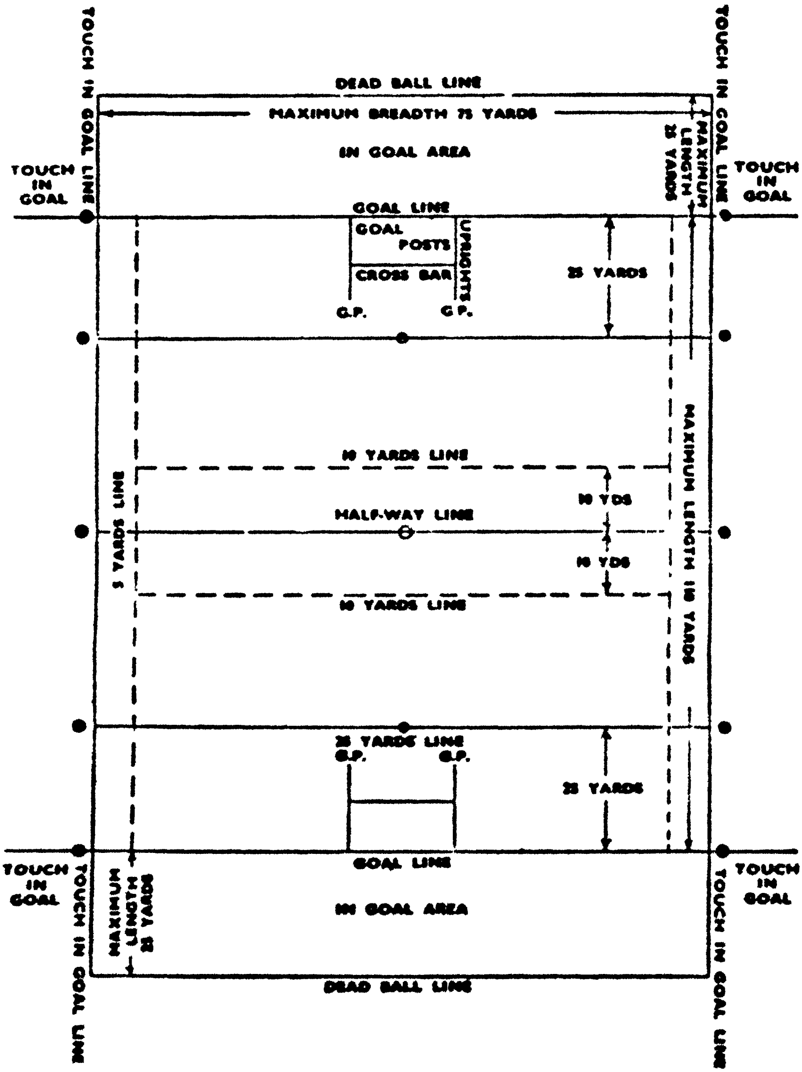


Fig. 1.—Field of play (not to scale)

● = Flag posts.

5 yards line. Ball at throw-in must travel beyond this mark.

10 yards line. Ball at kick-off must travel beyond this mark.

Goal-post dimensions: 18′ 6″ between posts; 10′ 0″ height from ground to cross.

accordingly the ball should, except in unusual conditions, be dispatched towards the kicker's left-hand touch-line. Watch the result. In most cases the defender, whether he be a back or a forward, will be observed making frantic endeavours to adjust himself, and if severely harassed by oncoming opponents, if not actually tackled, is quite unable to make an effective reply. But direction is not the only consideration. Close attention must be paid to elevation and distance.

There is little to be gained in making the short kick, that is, one that pitches on the kicker's side of the "25 line", if the ball does not remain long enough in the air to allow colleagues a reasonable chance of reaching it as soon as it drops into a defender's hands. To attain this objective the ball when placed should be set tilted towards the kicker's boot. This allows him to loft it, thereby increasing the time factor and so making following up of real value. In recent years slackness in this respect has been growing. Boys start at high speed, run about half the distance they should, and stop. They might have "saved their breath to cool their porridge". If they cannot stop the catcher making an effective return, it is time to adopt other methods. Perhaps it is the realization of this failing that has tempted many to resuscitate the long kick so much favoured by players in early years. It has points which make appeal: a knock-on, for example, can mean a scrummage in close proximity to the defenders' line. One thing against it is that it leaves the defender time to determine procedure. If he is supported by very fast backs, he may turn defence into attack by first gathering the ball and running straight for a few steps. This serves to fix his opponents' course and cause concentration on a particular point. Having achieved his purpose, a sharp turn to the open side of the field finds the defence wrong-footed, and a timely pass may lay the way open for a try or at least gain a very favourable scoring position. The long starting kick is therefore no panacea in itself. Success hinges on two things: mistakes by the defence or quick following up by the attacking forwards. And to be of any value the latter must be carried out with infinite care and judgment. Chasing the ball is worthless if it leaves the catcher opportunity to evade the tackle. Consequently there must be scientific approach, but this cannot be achieved by a single player unless he is blessed with a large slice of luck or faced by a callow youth. He has to run at top speed to get near the boy with the ball, and a single side step has him pawing the air. It is a

case of energy profitlessly expended. To be ruthlessly effective three boys are required to lead and concentrate on him; sometimes two bearing in from opposite sides can bring checkmate, but it is infinitely better to have another going straight ahead. This leaves no port of escape and obliges him to kick, usually in a hurry and often inaccurately. Meanwhile, the other five forwards have fanned out, and if they have positional sense have deployed to useful purpose.

There are times, too, when weather dictates the correct type of starting kick. Wind and rain make the ground slippery and the ball elusive. When these conditions prevail there is everything to gain and nothing to lose from slashing the ball fiercely, a foot or two above ground level, in a diagonal direction and allowing it to pitch before reaching an opponent. The result is usually most satisfactory. The ball gathers momentum and flies off at such speed that it provokes a knock-on or shoots into touch. Should the ball be returned to touch there will be a throw-in, which is the orthodox way of restarting play. In forming up it is good practice to have the tallest boy at the end of the line, for it is there that most opportunities arise for starting an attacking movement by the backs. Sometimes, and especially when defending, it is essential, however, to reverse the disposition, the case being decided largely by who is to throw-in the ball. It therefore behoves all to be watchful, and if in doubt to keep their eyes glued on the touch judge's signal. Knowledge beforehand is invaluable, as it enables the forward to take up his rightful position without a moment's delay. If the opposition are throwing in, he is able to mark a chosen opponent instantly. If otherwise, he can move into a place he thinks most beneficial to his own side.

Once position has been taken, the next business is to get possession by jumping and catching. This calls for much skill, and high efficiency is obtained only by continual practice. To obtain height the body should be balanced on the ball of the foot. Any boy who stands flatfooted can never get high enough in the jump; and the eye should be focussed on the ball, and not removed until it is safely grasped. But this is not all that is important in jumping. On the rise the body should be thrown into a half spin or roll, so that the shoulder which is farthest away from an opponent in the line is now thrust against him when the jump is completed. In many cases the swing upsets the players opposite, and if the ball is put down and colleagues rally round quickly it can be the beginning of the rush or

dribble. Its value does not end there. The turn, jump and catch, synchronizing, bring the arms and body into suitable position to effect an alternative means of attack, a true pass to one of the half backs, who, as a rule, are best placed to receive it. If it should happen that the pass cannot be made with certainty, it should not be attempted. In such circumstances endeavour to get the ball down and the foot over it. Aimless passing and fisting back to no one in particular, which is very common in modern Rugby, should be taboo. It presents untold trouble to the scrum half, usually the hardest worked man on the field, and mostly benefits the opposing side. Especially is this so if the ball bounces awkwardly, as the backs positioned for attack are not suitably placed to render him assistance. Nor can they stop the forward rush which is certain to develop if one gets up in time to control the ball. Frequently, however, the tackling and marking are so keen and tenacious at the line-out that neither side is able to make progress and a scrummage develops.

The Scrum.

To scrummage well is one of the most difficult things in Rugby and in all probability the least recognized. It is not the novice alone who imagines that a scrum is a trial of strength; instead, it is a very scientific affair. Weight and strength are valuable assets, but unless the packing and shoving are carried out with infinite skill, weight advantage matters little.

The formation favoured in Britain is commonly known as " three, two, three ", i.e. a front row comprising three players, the second two, and the third three. In South Africa they pack three, four, one; and New Zealand, until conforming to the Rugby Union desire that whatever system was practised there should be three in the front row, went down two, three, two.

In this country specialization is now recognized in every quarter. This means that players are chosen to fill certain positions in the pack, though they may be of very little value elsewhere. Unhappily, it has extended to the schools, and has had the unfortunate effect of lowering the standard of forward play. When first introduced in the seniors' games it was markedly successful, but it would seem that those who carried it into effect did not realize that boys would be trained from their earliest years to follow the example set. The success attained by the pioneers was based on playing men already

complete forwards in selected places. All had full knowledge of every position and could fill them if necessary. It is vastly different now; rarely are players able to accommodate themselves to change, and when they are, the scrum loses all semblance of shape and strength. It may puzzle the reader to know why the three, two, three formation is adhered to when the specific purpose of present-day Rugby is to make the backs the major if not the sole agents in attack. There is no particular reason for continuing it when wheeling has lost its attraction. If wheeling cannot be restored to its one-time greatness it would be better to adopt the South African formation. It has more than one thing in its favour. First of all, it has greater stability because there is not a hinge on which it can swing. Secondly, as speed is a prime necessity, no matter what the formation, it is much easier to attain this desired effect when the ball has to pass through only two rows. Now the avowed intention of the specialist is to smother attack at the onset. That is why two wing forwards are employed. Therefore it is absolutely essential that there be no delay in getting the ball through the scrum. It has been argued that the mission of these wing forwards does not differ from that practised by " rovers " ever since back play became predominant. True, all countries had " rovers ", but their performance was very different. They pushed in the scrum very effectively, as a rule, and did not break until the ball was out. Present-day wing forwards, on the other hand, as often as not take their places on the flanks of the scrum and break away immediately the ball goes to the other side. Why they bother getting down at all is a puzzle, unless it be that when their " hooker " is successful an angular position makes a protective screen for the inside half. However, when all is said and done, specialization is likely to continue. If this is an accepted fact, it is good policy to adopt the South African formation and scrap our own.

No one can deny that a ball that has to pass through only two rows of forwards reaches the base quicker. But this is not the only advantage conveyed by the system. The second row, containing four forwards, gives greater breadth to the flank, and in consequence the wingers position a little wider and thus give the scrum half more working room. Moreover, there is further gain in having these men closer to the opposing base; it would cut both ways, of course, if both played the same system. There is also greater freedom on the fringe. The two side men in the second row do not benefit

more, but the lone player in the third does. In our system he is controlled in large measure by the action of his flank men. The quicker they break, the quicker he can get away. But in the three, four, one formation he is absolutely free, and can get away without delay and apply himself at once to whatever purpose he deems most useful. But above all, this form of packing produces stability in the scrum. The above is more concentrated and the balance is nearly perfect. This statement is not based on theory but on practical demonstrations offered by clubs losing a forward through injury. Prior to depletion the pack going down three, two, three had been a swaying, unbalanced mass. Later it was steady as a rock and the whole team benefited. It must be granted that the same effect can be got from our own type of packing, but it requires far greater knowledge of the elements of scrummaging to bring it about.

Opinions diverge as to the best means of getting and maintaining solidity. Many advocate the first three going down together. That is to say, they form position standing, bend their backs and are ready to receive pressure. When all are of equal size, there is not much to be said against the procedure. It is a very different matter, however, if the front row is uneven—a small boy, for instance, and two bigger, as often happens when Rugby is being taught to junior boys. This presents a totally different problem if the small boy, who may be very keen on the game and also very good, is to be allowed to retain his place. The difficulty can doubtless be got over by removing him. That, however, is an intolerable position, and one which no games master who has the interest of Rugby football at heart will countenance. He has to make the misfits fit, and the task is not insuperable. Accordingly he will require the smallest boy to go down first and make the two on the flank dovetail into him. In getting down, the first thing he must concentrate on is keeping his head well down. If possible, endeavour should be made to get the shoulders low enough to allow them to slide on to the opposing middle man's chest whenever pressure is exerted. Immediately weight is applied from the other side, the legs must be brought into correct alignment with the back in order to get maximum powers of resistance, and when the flank men join him, in no circumstances should he allow them to pin down his arms as they are knitting together. Great care must be taken accordingly to keep the arms up until his colleagues have adjusted themselves.

This accomplished, a firm hold should be taken of the outsides.

The advantage of keeping the arms up until this has taken place is freedom of action when they bend over instead of under the other boys' arms. In the mid position he will be called on to strike quickly with his feet to secure possession. This cannot be done without raising a foot, which in turn leads to insecurity. By having the over-arm grip this is to some extent neutralized by swing or balancing on the outsides. If, however, the arms are allowed to go under, the position becomes impossible if a foot be moved. Should this occur, the best thing to do is to keep the feet on the ground and push as hard as possible, in hopes that the other fellow may give way slightly and not be able to get the ball back cleanly. Once position has been taken, the head and shoulders low, the legs should be placed apart firmly enough to give balance and pushing power. To obtain the latter they should be bent inward slightly at the knee to obtain extra thrust at the crucial moment, i.e. when the ball is entering the scrummage.

In striking for possession, or "hooking", as it is generally termed, one should learn to use both feet. As the ball has to pass one foot of a player on each side of the front row and touch the ground before a foot can be moved, great dexterity with the far-away foot is essential. It is a highly skilled business, and it is greatly facilitated by the manner of packing described above. By getting down first there is not the same danger of the outside forward obscuring the view, and the top grip enables the hooker to get buried deeper in the opposing front line.

In using the outside foot the toe and heel should turn on a half circle, the wider the sweep, co-ordinating with balance and stability, the better, as it is desirable that the ball in contacting the foot should pass as nearly down or towards the centre of the scrum as possible. Visualize the situation, or better still, turn the foot to an imaginary ball, and it will be obvious at once that the closer the ball is to the heel when it strikes the nearer it will be, on rebounding, to the central course. While this in progress the outside men must be prepared to lend assistance. In this case, the inside foot can be used to inestimable advantage as a guide vane. Great care must be taken, however, in moving the foot, as rash uplift and a sudden heave from the man opposite may disturb the entire structure of the scrum and make it impossible to get the ball back swiftly and cleanly. It is imperative, therefore, to hold fast so that the ball does not get entangled in the forwards' feet, particularly those in the second row,

for they are the bulwarks on which the scrum's strength depends. Should they be upset disintegration follows rapidly. Accordingly, the ball should be laid on in such a fashion that it passes fairly between them.

Once possession is secured it is everybody's job to continue pushing. In a measure it brings relief to the second row, who all through have had to bear the brunt of the work and pressure. Once it reaches the last row it should be "squeezed" out between the legs of the man, sometimes termed the "lock" forward, who is in the centre. All may be completely ruined by a vicious and careless heel. Recollect that the scrum half is being closely guarded, opponents are ready to pounce on him immediately the ball emerges, and it will be self-evident how necessary it is to let the ball out in a fashion that imposes no handicap. Having got the ball away successfully, it is opportune to return to the scrummage formation.

The front row has been dealt with; it is now the turn of the second. Primarily they must hold together like limpets, and exert power in such a way that it does not cause shelving. If the shoulders are too highly placed there will be this tendency. They should be thrust against the lower part of the hips, and the back and leg positions should be similar to those of the boys in front. Once settled properly, they should be able to stand any stress or strain imposed without being upset. An ill-formed second row is easily detected when hands go out grasping the front-row forward's pants. The hands and arms should go over the front-row forward's hip and rest there. Hands which grasp "shorts" hinder the front-row player's action. It must not be countenanced.

The formation of the third row differs from the others in some respects. The middle man pushes straight, but the wing forwards, while binding tightly to the "lock" forward, push in a slightly angular direction. To do so, place the outside leg deeper than the inside, so that the driving force has the effect of keeping the second row from spreading. It is sometimes maintained that the inside foot is the one that should be in the rear, and in support of this contention it is argued that it enables the wing forward to break quickly. This may be correct, but the wing forward's first duty is to push effectively, so that his side will have a better chance of getting possession, and if they do there will be no need for him to break and go chasing opponents. Even if the ball is lost to the other side there is good reason why the wing forward should stay in the scrum and

work. By keeping up pressure it is often possible to unbalance the other side when they are using their feet to steer the ball to the base. If this happens, it is practically certain to end in the ball coming badly to the scrum half, thus lessening his chance of getting it away expeditiously and accurately to the stand-off. Then is the time for the wing forwards to be up and doing. Sometimes, particularly when the ball is difficult to hold and the ground does not offer very secure foothold, the pack leader may decide to hold the ball and wheel the scrum.

The Wheel.

This is one of the finest and most intricate moves in the forward game, and to be a success necessitates all having full knowledge of the intricacies involved. A single mistake is sufficient to ruin it, and doubtless it would be used oftener in present-day football had specialization been given a minor place in earlier years. To effect the wheel—let us say it is to the right—the left-flank man in the front row must stop pushing immediately the scrum leader issues the order " wheel right ", while those on the right must shove their utmost. This makes the scrum unstable and it begins to revolve. Before this happens it is, of course, of the utmost importance to have the ball at the feet of the far-away forward in the second row from the direction in which the scrum is moving. The reason for this is that the second row is the first to disengage itself as a complete unit, and if the outside man had the ball and it swung away from him it might be gathered by the opposing scrum half. His job is to prevent anything of this kind happening when his colleague breaks. But there is much skilful foot movement required before this takes place. Indeed, the whole success of the scheme hinges on the second row's ability to adjust the feet correctly during the turning action and to gauge the correct moment to break away. In the turn, the feet and legs ought to remain in the original scrummaging position; the trunk alone should go round until it is impossible to go farther without upset. When this occurs the second-row men should swing clear, get their heads up and commence dribbling.

There does not seem to be anything very difficult about this. Nevertheless, when the wheel is practised it is very rare nowadays to get players to break at the right angle. What is the correct angle? Approximately sixty degrees from the touch-line. Unfortunately for players, they cannot work with a protractor but must trust to in-

stinct. Therefore to reach perfection intensive practice is necessary. If the break takes place earlier, the movement is directed across field and is not of much value. If it is late, a diametrically opposite course is steered. Between fifty and sixty degrees, however (the correct angle for breaking), the second row, when they get clear, are facing downfield and can progress without having to change direction. This is important, for the loss of a second or two is sufficient to upset the move. The wheel, in short, to be successful requires to be carried through at top speed. To achieve this every player in the scrum must know what is required of him.

At this stage positions must be carefully chosen. As mentioned previously, the ball is brought through by the second row, who start dribbling. Once this is effected every precaution must be taken to keep the ball going ahead, consequently the three boys who form the back row should be conveniently spaced in line to cover any untoward turn it may take. Should it curl away from the leaders, it is the duty of the boy in the row following who is nearest it to join issue. This is perhaps elementary, but it is not always appreciated that the player who has lost control should swing back immediately and take the place of the one who has gone forward. By so doing he reduces the chance of progress being stopped.

In particular conditions, heavy ground and a wet ball, different methods may be applied with a good deal of success. Cross dribbling, that is, passing somewhat after the fashion followed in Association games, and kick and rush tactics, can be very effective. In early years, however, they should not be substituted for real dribbling. Should the dribble be checked by an opponent going down on the ball, endeavour should be made to get feet over it and propel it to the rear. This is usually termed " heeling from the loose ". The advantage of this manœuvre is immense, if the scrum half is up with the ball or if it is directed to a forward who has been backing up. Instantly it should be whipped out to the backs, as they have a great chance of scoring through those opposite having to run out of early defensive positions to check the dribble. (See fig. 2.)

Selecting boys to play in particular places before they have been taught the forward game in all its aspects, has ill-fitted them for the concerted action that makes wheeling a successful and highly profitable means of attack. Some say the wheel is easily checked, and dismiss it as of no account. One must admit that the wheel as practised at present is not very inspiring, but the only semblance it bears

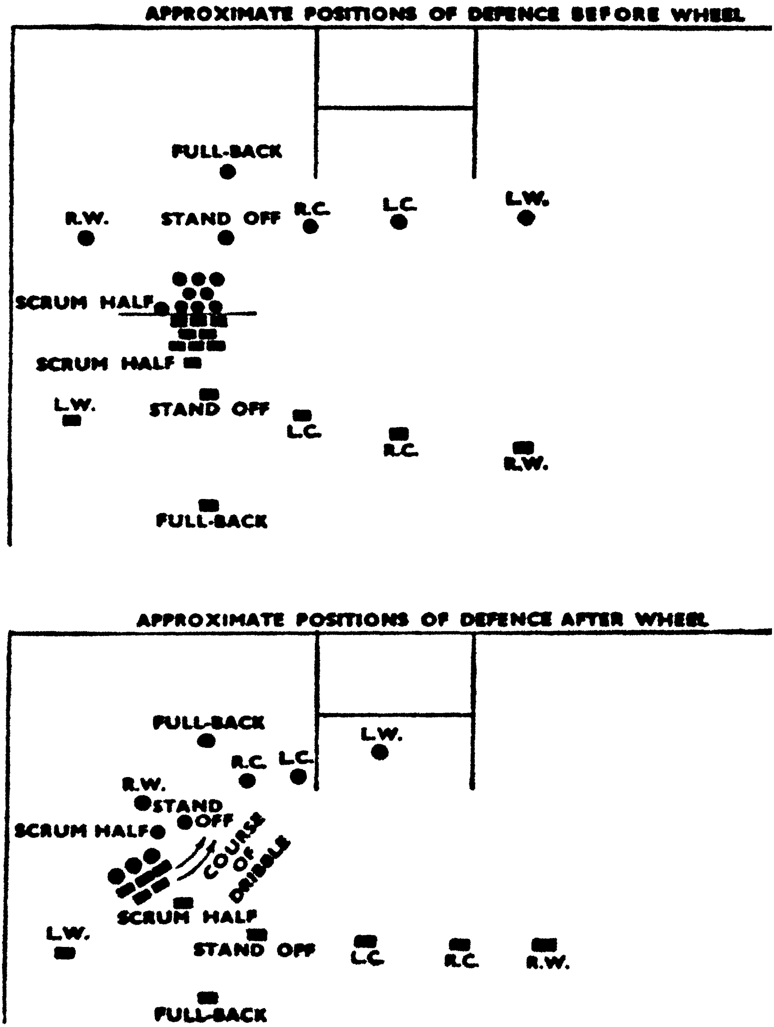


Fig. 2.—The Wheel

To meet the attack, *defence* has had to take up positions closer and deeper. *If* the ball is checked and heeled to the scrum half and he in turn sets backs in motion, a score is probable.

to the real thing is that the scrum turns. Unhappily, so does the ball, and one looks in vain for forwards with their heads up. It is easy enough to check this kind of wheel, but a very different matter if the scrum is spun immediately the ball has been secured, and by the time the ball has reached the second row it has turned sufficiently to allow these men to start off with it at their feet. Even, however, if the movement can be checked by the opposition breaking equally fast and getting around to stop progress, it offers an alternative means of attack and thus adds match-winning moves, for wheeling is a most effective way of upsetting defensive positions. If successful, every opposing back has to readjust alignment, for the disposition prior to this has been arranged to deal with a three-quarter movement. Instantly they have to scurry across field to cover another threatened point, as the half backs cannot themselves be expected to check eight forwards on the move. Visualize the value of a pass at this moment to one of the attacking backs who are sure to be in close attendance, and it is plain that a gilt-edged scoring chance is on offer.

Dribbling.

To become expert dribblers boys must practise assiduously. In early years it is advisable to use an old ball, as it is less pointed than a new one and therefore easier to control. Speed at this stage is of secondary importance; pace can be quickened as control develops. True dribbling, in contrast to kick-and-rush methods, requires the ball to be kept within a foot or two of the toe. To acquire the art the body should be tilted forward, so that the eyes are constantly on the ball. If the body be carried erect, the toes tend to rise and the ball shoots off and makes clearance by a defender simple. Indeed, it is often as useful as a pass from one of his own side. Therefore it is of prime importance to keep the ball under control, and to do so it is advisable to use the instep and be able to propel the ball forward with whichever foot approaches it. A boy who can use only one foot effectively labours under a great handicap, for he is unable to "wrong-foot" his opponents. The value of this, for some unexplainable reason, never seems to be thoroughly appreciated. If a back wrong-foots an opponent by change of step his skill is recognized at once, but if a forward does precisely the same thing when he sweeps the ball from the left to the right foot or *vice versa* the

action is unheralded. Watch the defence to prove the correctness of this statement. They keep moving hurriedly from one direction to another in hopes of causing checkmate.

While this is going on, one thing that should be avoided above anything when approaching a defender is to dribble towards the open side of the field, that is, the part on which the defending three-quarters are stationed. If control is not perfect it is liable to allow the defence to go over to attack. By turning towards the narrow side the danger of such a thing happening is very much less. The defender in this case is not so well supported, and is in all likelihood satisfied if he can get the ball into touch in order to get his side into a stable position. Sometimes when dribbling is in progress the ball bounces awkwardly. When this occurs it should be forced down by the leg nearest to it. This is done by crooking the knee and forcing the ball down to ground level. Many attempt to gather it when this takes place, but few succeed. Always a more favourable moment should be awaited. This occurs when the ball rises high enough to permit it to be gathered without undue risk of stumbling. Once the ball is in the hands, opportunity is presented to open up to the backs or the forwards, whichever are more favourably placed.

Scrum Half.

It is said a scrum half is born, not made. Doubtless there is a grain of truth in this statement, but the same might be said about a forward or a back. It is largely a question of adaptability. Generally, small, robust boys are considered ideal, just as the big chap is earmarked as a forward. Experience has proved that there is no good reason for this, as many of the greatest scrum halves down the years have been big lusty fellows who could easily have held their own in the pack. Whoever plays in this position, however, must have a fine combination of agility, strength, skill and quick thinking, for the success of the whole back division rests with him. Primarily his job is to get the ball to the stand-off half at high speed. This requires continual practice, and a working arrangement with the stand-off half is absolutely essential. It is the latter who directs the line of attack and who in the process must get the ball in a particular direction. He may want it straight back, to the open side or to the narrow, often termed the blind side.

In order that no time be lost in achieving this, code words or

numbers are advised, e.g. "one" can stand for straight back, "two" for the open side, "three" for the narrow. When the ball is heeled it is imperative that it be got back to the stand-off half at the greatest speed. The loss of a single second is enough to ruin the outside's chance of engineering an attack. Look at it in this way and it will be obvious. Most boys can run 100 yards in about 12 seconds. Accordingly, if the scrum half loses a second, it means that an opponent bearing down on his partner is approximately eight yards closer when the ball is received. In turn, this means less room to work in, even if the tackle is not effected. Moreover, it is not the sum total of loss. Every defender has advanced to a more suitable point and checkmate is almost bound to follow. Therefore the scrum half's first consideration must be speed, and to accomplish this footwork claims attention. The heavy-footed should not be candidates. It is a place only for those who can balance and swing easily on the ball of the foot, otherwise there will be separate movements which squander time. There are three actions: the pick up, straightening the back after bending, and the pass. All must synchronize. Accordingly, the foot nearest the scrummage should be advanced when the ball is emerging, but not so close as to make the place of pick-up too near the vertical position of the body. The body should incline towards the inside foot and the pick-up be made just in front of the toe, so that when the body is being brought back to the normal position there can be a full-arm swing. While this is taking place the outside foot (that is, the one nearest the stand-off) should be turning in his direction. By doing so, the follow-through becomes perfect and the long-distance pass assured. Accuracy can be got only by constant practice. To obtain it is a problem, as situations differ greatly in match play. Much can be achieved, however, by the stand-off half and his partner practising together. A barrier against which the ball can be thrown is helpful, as the ball, rebounding at various angles, offers opportunity to the scrum half to gather and pass to his colleague from odd places.

In delivering the ball two other points must be observed, height and direction. It is not enough to get the ball to the requisite distance; it must be dispatched in such fashion that it does not halt progress. This is best got by sending it out waist high and approximately a yard or so in front of the stand-off half's starting position. If it be low or high, the receiver is practically certain to become

slightly unbalanced in making the catch and thus loses valuable time, even if he is successful in gathering. If it be too straight, it prevents a flying start and is responsible for the outside half taking the ball standing. Always it must be served in a fashion that allows it to be taken at top speed.

Another thing which troubles many is inability to make the pass without throwing themselves on the ground. It should be avoided, and can be if the different muscles are properly developed. The main objection is that a player on the ground is out of the game, even if only for a moment, and may not be up again in time to support a movement. Nevertheless, if it is the only possible way to make a satisfactory pass in given circumstances it should not be ruled out. If it makes the difference between a fast long pass and a lobbed one, then by all means go full out and make sure that the fingers are well spread on both sides of the ball, so that spin is eliminated.

During the course of play the scrum worker may find that even with good passing his side cannot progress because of close marking. When this becomes apparent he should concentrate on breaking away. He may not make much progress, but change of tactics causes the defence to pay less attention to those immediately opposite. Once decided that the breakaway must be attempted, a favourable opportunity should be awaited. This is presented when the scrum swings. The open wing forward in most cases has broken and is moving across field, and as the scrum is moving in the opposite direction there is a greater gap than usual between the two. Now is the time to go all out; determined running may bring a try. The chance of catching the opposition off guard on the blind side should always be under review too. A sudden angular dash may draw the wing three-quarter and wing forward and pave the way for a pass to the outside three-quarter. Actually the opposing wing "three" should remain guarding the flank, but often the unexpected appearance of the scrum half running into an open space draws him like a magnet. Another of the scrum half's duties is to put the ball in the scrum. In doing so he should make it his business to let the forwards know from which side it is coming. If it be heeled by the opposition, he should follow his *vis-à-vis* round and keep as close touch with him as possible without getting off-side. By doing so there is a chance of making a smother tackle, thus preventing him getting rid of the ball to useful purpose.

Stand-off Half Play.

Given good service from his partner, the stand-off half is the most important man in the back division. Bearing this in mind, it can be easily seen how essential it is to have a working arrangement with his partner. First of all, there is the question of stance. This should be in a line almost directly behind the scrum, for the reason that it keeps the opposition from knowing the direction in which the stand-off is going to run. Prior to the ball being put in the scrum, he should have a clear picture in his mind's eye of the disposition of the opposing players. In some particular direction the defence may be badly lined or widely spaced and thus offer a distinct chance of the break-through being successful, so immediately the ball has been hooked he gives the inside man warning that he wants the pass sent out to a particular point and shapes his course accordingly. Maybe, however, there is no loophole. If this be so, his business is to attract defenders and ease the situation for the three-quarters.

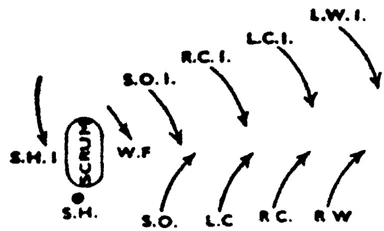


Fig. 3.—Effect of stand-off running across

Stand-off runs across without changing direction. *All* three-quarters are forced therefore to run towards touch line. They become bunched and cannot make headway.

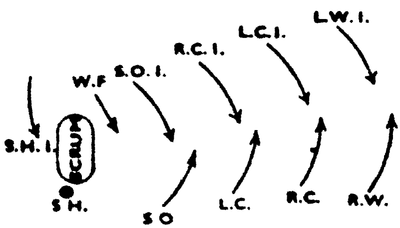


Fig. 4.—Effect of stand-off half straightening run

Stand-off half, by straightening run, draws opposing stand-off and also tempts the right centre to tackle him. This gives opportunity to left centre to break through or pass out and get overlap on the wing.

S.H. Scrum Half. W.F. Wing Forward.
S.O. Stand-Off. R.C. Right Centre.
L.C. Left Centre. R.W. Right Wing.
L.W. Left Wing.

To accomplish this, it is imperative that the stand-off should run for the gap, that is, the space between two defenders. This is far from simple. In the beginning he starts running diagonally, and to attain his object he must swing away from that line and make a frontal movement. This is what is known as straightening. (See figs. 3 and 4.) To do this at will is one of

the hardest things in Rugby football, and can only be mastered by those prepared to devote time to it. Body balance and side-stepping are the things to aim at. Once attained, stand-off play assumes new importance, for mechanical passing out gives way to a battle of wits. Defenders have a set purpose in view—to keep him running across the field, and to defeat this must be his object. Sometimes, owing to close marking and quick-breaking wing forwards, in conjunction with a slow or faulty pass, it will not be possible in the room available to do anything helpful.

When this happens, the short kick ahead is often invaluable, and can be a source of great trouble to opponents. In practising it, perhaps the best method is to drop the ball and allow the on-coming foot to sweep it ahead at ground level. The advantage is this, that no time is lost and the risk of a charge down is avoided. Endeavouring to kick the ball in the air causes a fractional time halt and may enable it to be charged down. Moreover, if the full back has come up quickly he has very much less chance of gathering the rolling ball than one which is in the air on a fixed course. This apart, the kick ahead is a very useful diversion, provided it is skilfully used, as it deters defenders from pressing too far forward. In short, they are in a cleft stick, not quite sure whether to advance or get ready to go about. The outcome is that the stand-off is in the ascendant, for he has now sufficient manœuvring area to work his will and strike at weak spots. Even so, it is a good plan to let the three-quarters have the ball a few times early on, to allow them to get the hang of things.

The passing should be swift and accurate, and every boy should line deep enough to permit the ball being taken while running at top speed. Nevertheless, the main duty of the stand-off half before passing is to draw opponents, the more the better, and thus make potential scoring chances for the three-quarters. If he runs across, every step taken makes the prospect of successful attack recede; the three-quarters become bunched and stationary. In almost every case the wing man is collared, if the ball gets as far, often without a yard of ground being won. It must be obvious, therefore, how important it is to swing from lateral to direct running. The stance encourages the former direction, and the ball passed from the scrum at a sharp angle is unhelpful. Everything, in fact, discourages straight running, yet it must be attained; so those who essay the stand-off position must not only have safe hands and a quick eye

for an opening, but be complete masters of the art of balanced running.

Kicking.

At times it is essential that the stand-off should be able to relieve pressure by kicking to touch. This is mainly necessary when his side is on the defensive. The value of long and accurate kicking cannot be overstated. It has many valuable uses. One in particular is relieving the strain on a pack of forwards lighter than those on the other side, when the backs are not altogether trustworthy. There is nothing more tiring than a succession of scrummages, and there is probably nothing more disheartening to an attacking side who have expended much energy to get within scoring distance than to be repeatedly driven back by well-judged kicks which gain 30 to 40 yards or more. The method employed is to drop the ball from the hands and kick before it touches the ground; this is known as "punting". The applied force should come from the instep, and at the moment of impact the leg should be rigid and have the full power of body swing behind it. Mark well, however, the difference between kicking into the wind and with it. With a following breeze the leg should follow through, as it assures accuracy as well as distance, but when the reverse is the case the foot ought not to be allowed to travel much beyond the fixed position of the other. If this practice be followed, it will be found that the ball travels at a lower altitude and "cuts" the wind. Care, however, must be taken that it rises high enough to prevent defenders interfering with its progress.

Successful kicking, whether punting or dropping, is largely a matter of timing, and all players, forwards as well as backs, ought to concentrate on being efficient kickers with either foot. By doing so they enhance their own value, as no matter on which side of the field the ball is received, they can return it advantageously. Equally important is the drop kick, which has the added attraction of being a medium of scoring. It is made by dropping the ball as in punting, but differs in this respect, that the ball must touch the ground before being kicked. A successful drop kick earns four points, and many a game is won by this means. Here again, timing is the thing that matters. All backs, and particularly the stand-off half and centre three-quarters, should master it.

From the foregoing it will be gathered how necessary it is to

master the art of kicking and to be expert in the use of both feet. As an illustration, take a movement that goes from right to left, or a break away towards the left touch-line, when the occasion calls for a cross kick. If the player in possession can kick with the right foot only, he is immediately at a disadvantage, as he must stop and turn before he can send the ball in the required direction. As a rule, he is too closely pressed to be able to do this, and has to be satisfied with kicking to touch on the side he is heading for, whereas if he had been able to use the left foot the ball could have been turned on the run to the open and a scoring chance given to fast following forwards or " threes ".

Three-quarter Back Play.

In dealing with three-quarter play the stand-off half cannot be ignored, for he is the pivot on which successful play hinges. In taking alignment, therefore, the inside centre must be sure that enough space is left to allow the stand-off scope to manœuvre. Note well that in gathering the scrum half's pass he makes a diagonal run and therefore requires room in which to straighten. Just how much should be allowed must be decided by the player. Some can turn almost at will, while others do it gradually. Having decided the matter, the position of the other " threes " focusses attention. Care should be taken not to stand too wide. This is a common fault and is probably caused by players thinking they have greater freedom in the wide open spaces. It is a fallacy. It makes passing ever so much more difficult and courts interception. A distance of five to six yards should be aimed at, but perhaps the best way to judge requisite space is to apply the test of whether a defender can stop two attackers. If he can, the distance must be increased sufficiently to prevent him doing so. Once this is determined, there is no possible excuse for lobbed and inaccurate passing, as so often happens when players are stationed yards too far apart. This holds good for play with a dry ball, but is doubly effective when the ground is sodden and the leather slippery. Care must also be taken in the angle for attack. If the ball is being heeled with great regularity, the three-quarter line can profitably take up a position on a line as much as 45 degrees from the scrum base. This allows ample room for each man to get up full speed before being challenged by an opponent. If, however, the ball is coming out on a fairly even basis it is advisable to lessen the angle, as even though all are watch-

ing the ball intently there is a risk of not closing quickly enough to prevent a trenchant runner breaking through.

When defending, particularly inside the 25 area, the situation is different; all should close up to form a line parallel with the goal posts and keep as near the ball as possible without getting off-side. Sometimes it is good policy for the wing three-quarter to fall back a few yards. The object is to cover the diagonal kick. It may be resorted to by a side too close-hauled to make progress by handling. It gives him the advantage of not having to turn and run back, a very important thing when a yard or two may be all that is necessary to make the difference between clearance and a try. To be a successful three-quarter calls for the best qualities in a boy. He must be courageous and prepared to stand rough handling. He must have an alert brain and safe hands. Dropped passes are gifts to the opposition, especially in the centre, and anyone incapable of holding the not too well-thrown pass should seek a less exacting place. The golden rule in catching and passing is: keep your eye on the ball. It seems ridiculous to write it, but there is hardly one match played in which this rule is not broken. Beautiful moves skilfully engineered are ruined by the action of one player fixing his eye on an opponent instead of upon the boy with the ball. A quick glance, to make certain the distance and position of an opponent, is all that is necessary.

Giving the pass well demands much attention to detail. First of all, the ball must be held firmly by both hands around the middle and lower part of the shorter axis, and the sweep of the arms should carry through so that spin is not imparted. At this stage the eyes should be fixed on the boy who is to receive the pass. When travelling at high speed this operation is not easy, for another factor emerges—leg action. When failure occurs it is often traceable to the pass being made off the wrong foot, so pay heed to this. If the ball is to go to the left, the swing of the arms must synchronize with the advancement of the right leg; if to the right, *vice versa*. This not only gives power and direction to the pass, but it preserves balance and ensures the ball reaching its destined place without going forward. Once these things have been mastered the supreme test is approached—timing. One may be able to do all the aforesaid things satisfactorily and fall short of being a first-class player through inability to let the ball go at the crucial moment. There is no easy way of acquiring this faculty. Continual practice is the only solu-

tion. Some acquire the knack quicker than others; instinctively they seem able to judge the moment when an opponent can neither tackle them nor interfere with the player who is to receive the ball. This is the hall-mark of the first-class player. Should the pass be given too soon, the defence are able to concentrate on the recipient; and if delayed, a smother tackle or interception occurs and all chance of making a breach in the defence must fail. In the approach the centres must never lose sight of the fact that the object to be achieved is to move an opponent from a set position, whether by running for the gap or by change of direction. Whatever the strategy, it is incumbent that they invite two opponents to tackle them and thus get overlap or, as it is usually termed, " the extra man ".

Usually the extra man is the wing three-quarter, and once in possession he should run all out for the line. Should he be hard pressed by the full back travelling across, it is good practice to veer towards the middle, then turn out again. This serves to check, temporarily at least, the defender's advance and gain sufficient time to enable him to be rounded.

When running, the ball should be carried in the arm nearest the touch-line, as it enables the " hand off " to be employed. This should be applied judiciously, as the prime motive is to evade a tackle and at the same time preserve balance. Therefore the action should coincide with the fall of the inside foot. If the outside arm be used, the reaction from the hand off is practically certain to knock the runner off his stride. In the event of being close-hauled the kick across should be used. To profit, however, it requires skilful placing. Haphazard kicking is useless. It should be the aim of the kicker to shape the ball's course so that those following down the middle have at least an equal chance with the defence of securing possession. Midway between the contending parties is the advised place.

So far it has been attack that has been the theme, but the " threes " have an equally important part to play in defence. Again they must align themselves on the stand-off, and in coming up to the tackle should make it their business to approach an opponent on the inside. This forces him across and makes any attempt at cutting in extremely difficult. In addition, it induces the easiest of all tackles—the " side on ".

The Full Back.

The full back is the last line of defence, and the first qualification is a safe pair of hands. Nothing rattles a team more than the thought that they are likely to be let down by bad fielding. Furthermore, nothing tires and dispirits forwards as much as racing back to cover mistakes. In gathering the ball the muscles of the hands should be relaxed and the ball allowed to sink into them as if it were falling into a cushion. Errors, as a rule, occur when the hands are held stiffly. When fielded, running across should not be attempted unless the other side are so badly placed that prospects of a pass to one of the "threes" presents a reasonable chance of making a bigger advance than would be possible from a kick to touch.

Running across and kicking to the other touch-line is not advised. It is rarely profitable and imposes extra work on the forwards, who have to scurry across field for a line-out that could equally well have taken place on the other side. It is much more important after gathering the ball to move infield so as to widen the angle and get a sure touch. Never over-kick; it is far more important to get the ball into touch twenty-five yards ahead than to kick forty yards and have it go to an opponent who in all likelihood makes a profitable return. Positioning must be closely studied. Anticipation and instinct provide a combination which makes the full back's job as nearly a sinecure as anything can be in Rugby. It cuts out nearly all difficult fielding and rarely allows opponents to get anywhere near tackling distance. And mark well that anyone contemplating taking this place must be able to use both feet to good purpose. In addition he should be an adept place kicker. His job rarely brings him into the rough and tumble, like a forward, for instance, and this being so he is better fitted for the job, as steadiness is one of the main essentials in successful place kicking. He will, like others, require to be a good tackler.

Field play is the best medium to attain perfection, but some value is attached to practice in the gym with a sack stuffed with straw and suspended from a beam. Swung backwards and forwards it helps to improve timing, perhaps the major point in this extremely difficult operation. How an opponent should be tackled depends on different circumstances; often one hears the instruction "go low". Well, there is no sense in going low if the man is brought down near the line and falls over for a try. In a case of this kind

everything should be done to halt his progress and prevent him passing. He should be taken round the arms and grappled as closely as possible. Each individual case presents its own particular problem, but whatever happens, go for the man with the ball and if possible prevent him passing. When making the straight tackle keep the head well down on the shoulder farthest away from the player who is to be brought down. In launching the body thrust must come from the legs, and the point aimed at should be in the region of the thighs. To get full value for this most difficult tackle, the shoulder which is to be thrust against the other player should be directed in such fashion that the power of the thrust does not halt when the shoulder comes in contact with the player who is to be brought down. It should carry through him, so that he is not only stopped but bowled over.

SAILING AND MOTOR BOATS

Sailing can be the most exciting sport in the world. It can also be very dangerous, so remember—never play the fool in a boat, and always treat the sea with respect.

THE SAILING BOAT

So that you may understand some of the language you hear among yachtsmen, fig. 1 shows a few of the commoner types of craft.

A boat with " round bilges " has a section like fig. 2.

A boat with " hard chines " has a section like fig. 3.



ROUND BILGE

Fig. 2



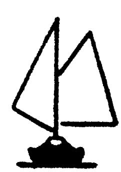
HARD CHINE.

Fig. 3

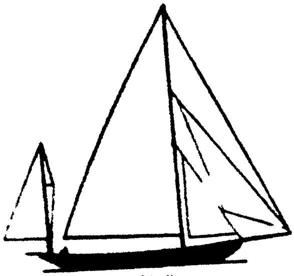
There is an infinite variety of sailing dinghies, from a yacht's 6-ft. pram with a tiny lugsail to the international one—designs probably costing several hundred pounds. We cannot describe them all in detail, so will concentrate on a very popular boat, the 14-ft. sailing dinghy (see fig. 4).

The art of sailing is the art of using the wind to the best advantage. Seamen describe the wind according to where it is blowing relative to the boat.

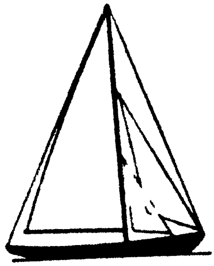
1. *Sailing before the wind*, i.e. the wind aft.—You sail with your mainsheet well out, so that the sail is nearly at right angles with the ship. If you have a jib you may boom that out on the opposite side, so that you are sailing like this: i.e. goose-winged. Any pole such as the boathook will do, though some ships carry a special sail called the spinnaker, and carry a spinnaker boom for the job.



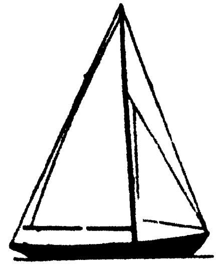
Most beginners think sailing before the wind nice and easy and



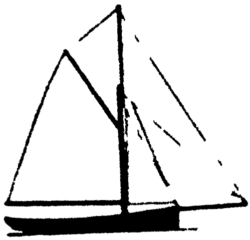
YAWL



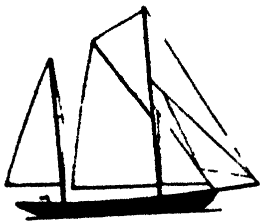
BERMUDA CUTTER



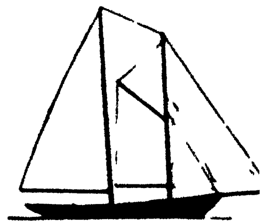
BERMUDA SLOOP



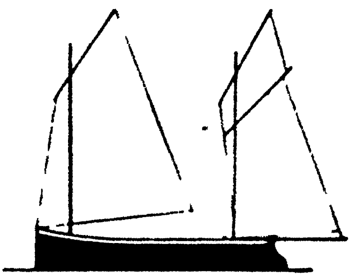
GAFF CUTTER



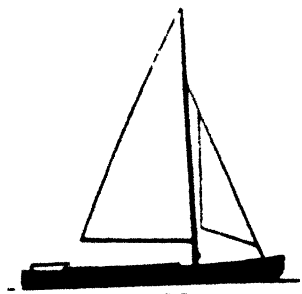
KETCH



SCHOONER



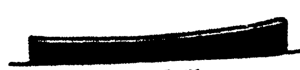
DIPPING LUG



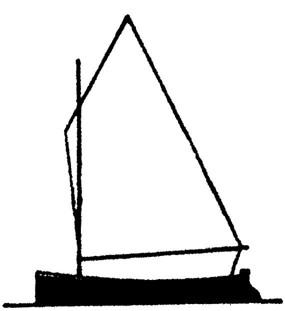
SHARPIE



PRAM

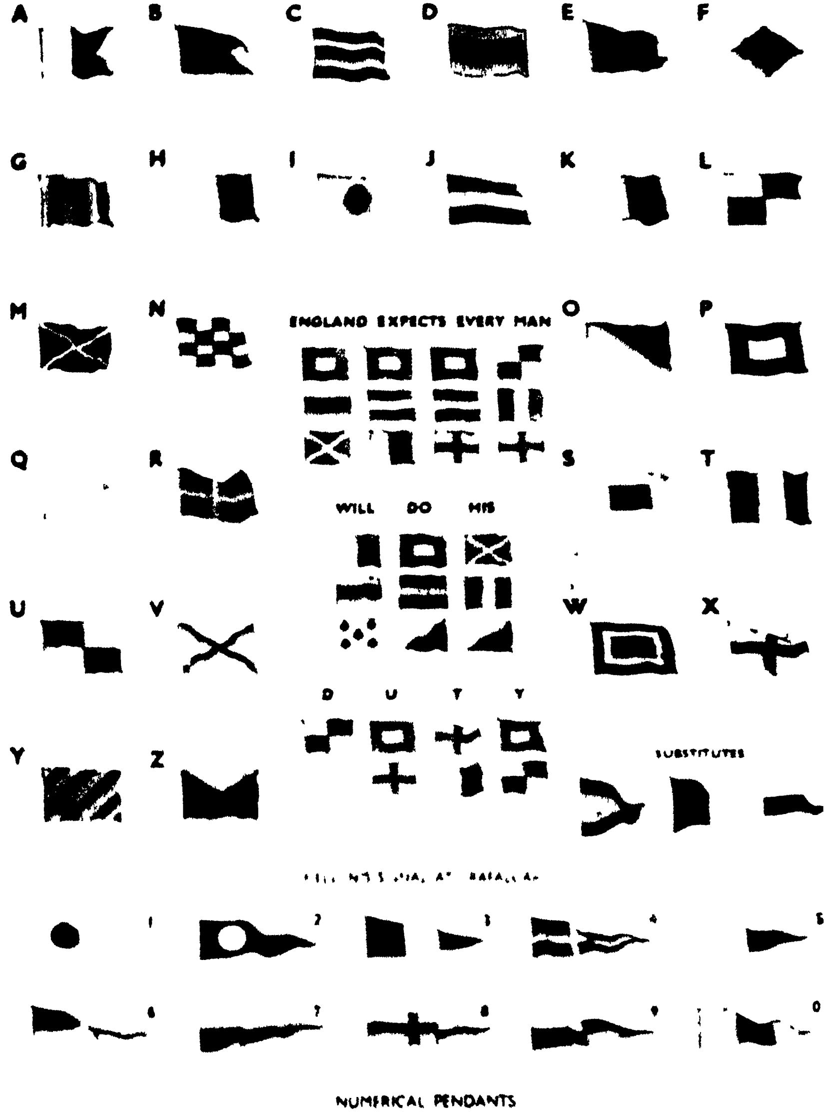


DINGHY



STANDING LUG

INTERNATIONAL CODE OF SIGNALS



INTERNATIONAL CODE OF FLAG SIGNALS

comfortable, as the ship makes good progress and sails more or less on an even keel—that is until someone "gybes". This is when the wind gets forward of the sail instead of aft, and the sail fills

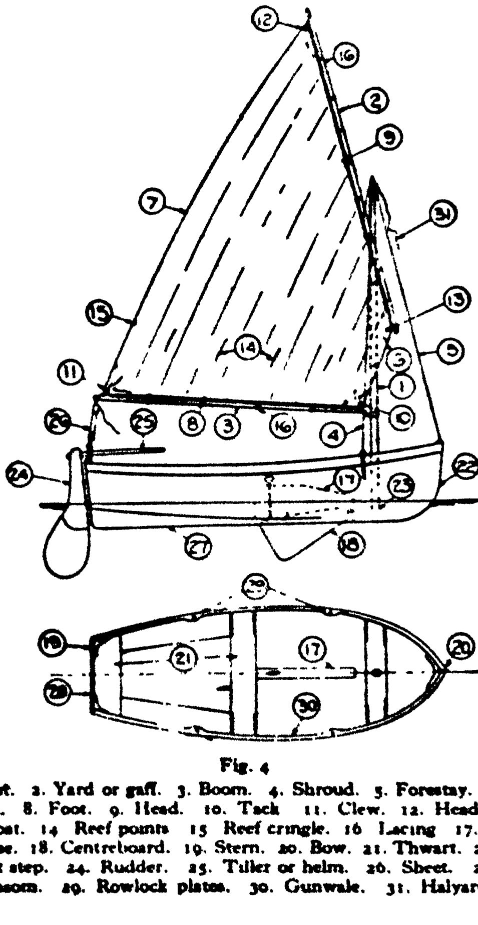
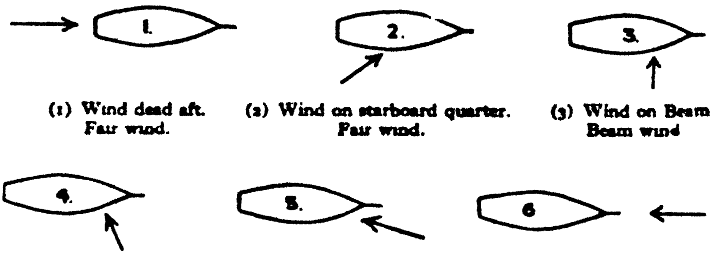


Fig. 4

1. Mast. 2. Yard or gaff. 3. Boom. 4. Shroud. 5. Forestay. 6. Luff. 7. Leech. 8. Foot. 9. Head. 10. Tack 11. Clew. 12. Head cringle. 13. Throat. 14 Reef points 15 Reef cringle. 16 Lacing 17. Centre-board case. 18. Centreboard. 19. Stern. 20. Bow. 21. Thwart. 22. Stem. 23. Mast step. 24. Rudder. 25. Tiller or helm. 26. Sheet. 27. Keel. 28. Transom. 29. Rowlock plates. 30. Gunwale. 31. Halyard.

on the wrong side, so that it blows across to the other side of the ship, sometimes with dire results. A bad gybe may capsize a dinghy, and may carry away gear on a larger boat, not to mention the danger to life and limb of the boom suddenly swinging across, or possible complications if anyone had himself foul of the sheet.

To avoid an accidental gybe, watch your sails carefully, and at the first sign of any lifting put your helm down, i.e. towards the sail, and so bring her head towards the wind. As soon as the sail has steadied, the danger is over and the ship can be brought back on to her proper course. If you have a burgee you are safe so long as it blows out towards the mainsail, but if it starts to blow on the other side, be careful. If you are sailing " goose-winged ", either



(1) Wind dead aft. Fair wind.
(2) Wind on starboard quarter. Fair wind.
(3) Wind on Beam. Beam wind
(4) Wind forward of beam. Wind free.
(5) Wind nearly ahead. Close-hauled. Foul wind. Head wind.
(6) All sails flapping. Boat in irons!

FIG. 5

sail may gybe, but the mainsail is the one likely to do damage. When passage making it is often worth steering a little to one or other side of your course if the wind is dead aft, and so lessen the risk of an accidental gybe. When, due to a shift of wind or change of course, it is necessary to gybe, first haul your sheet well in, then put your helm up, i.e. away from the sail, gently—let the boom come across, and let out the sheet again. With only a little sheet out as the boom comes across, it is under control and will not come crashing over. In rough weather or difficult conditions it is sometimes better to get the wind on the other side of the sail by luffing right up and tacking. (See sailing terms, fig. 6.)

2. *Sailing with the wind on the quarter.*—This is the easiest way: your sheet will be well out, just far enough for the luff not to shake. Your headsails, if any, will be sheeted on the same side as the mainsail, again, just far enough out not to shake.

3 and 4. The more forward the wind becomes, the more sheet you will have to haul in, until finally you are sailing as close as she will go, i.e. you are close-hauled (5). *You are " reaching " for 2, 3, and 4.*

5. *Sailing close-hauled.*—Some boats sail much closer to the wind than others, and most beginners make the mistake, when sailing close-hauled, of hauling in their sheets too far, and so making the boat sail too slowly, and feel dead. It is impossible to sail directly into the wind, so when you cannot sail the course you must zigzag, sailing close-hauled, first with the wind on one side, and then on the other; this is called tacking. When the wind is from the starboard side, you are said to be on the starboard tack, when it is from the port side you are on the port tack (fig. 6).

To tack, or " put about ":

1. See your ship is sailing well and not too close.

2. Then " ready about " a warning to your crew, to duck or stand by to let go the headsheets.

3. Then " lee-o ". Put your helm hard down (towards the mainsail) and let go the jibsheet. The sails will flap violently, but the mainsail will quickly come across to the other side and fill with wind. Pull in the other jibsheet before it fills with wind, if possible, but not before her head is well round or she may miss stays. You will now be sailing on the other tack. Once the sail is refilling steady her by bringing the helm amidships, but don't be in too much of a hurry or you may get the boat in irons, i.e. with all sails flapping, and heading directly into the wind, quite out of control, and probably soon gathering sternway. If this happens, and you want, say, to get on to the starboard tack, put your helm to starboard and pull the aft end of the boom a bit to starboard, in an endeavour to get the mainsail filled with wind. If you have a headsail get the weather (in this case starboard) sheet, and hold it out to starboard, that may make the sail fill with wind and blow her head off to port, and you should be able to get sailing again. If she won't respond then get out an oar and row her head round. A ship " misses stays " if she will not put about—a foul bottom, inexperienced helmsman, rough sea, or sudden squall may be the reason. If in a small ship, and it is urgent to get about, an oar will probably do the trick, but if you have no oar then you must " wear ship ", i.e. get about by gybing, put your helm hard down, and keep it there till the boom comes across—you may have to let out some sheet before she will " pay off " as it is called, but remember to haul it in again as she actually gybes.

Handling.

When you are sailing close-hauled, a sudden gust of wind, i.e. a squall, may heel your ship dangerously; then immediately let out your mainsheet, and this will spill the wind out of the sail and bring her more upright. In an open boat, *never*, *never* make your mainsheet fast—always hold it in your hand. You will find experts, even in big yachts, continually " feeling " their sheets—letting them

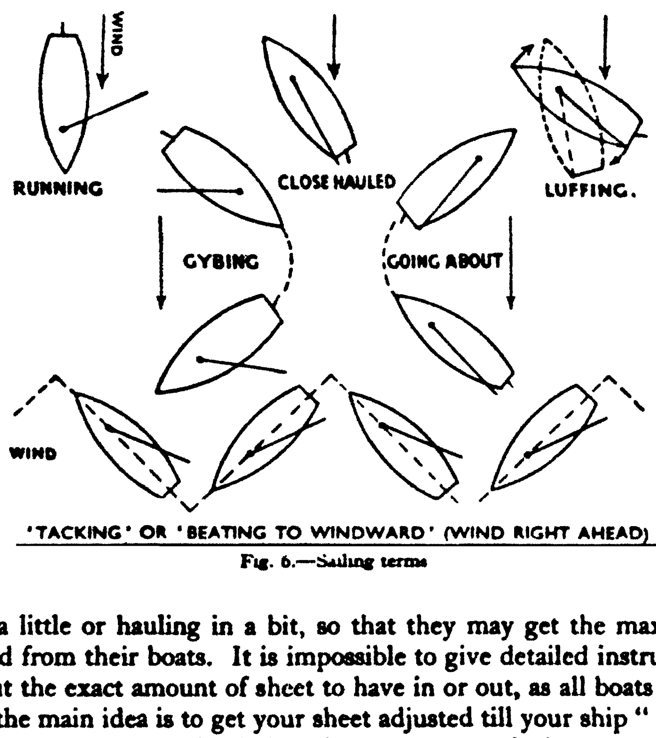


Fig. 6.—Sailing terms

out a little or hauling in a bit, so that they may get the maximum speed from their boats. It is impossible to give detailed instructions about the exact amount of sheet to have in or out, as all boats differ, but the main idea is to get your sheet adjusted till your ship " feels " her best. The general rule is to have out as much sheet as possible, so that the sails are well filled with wind and not flapping, with the ship on her course, or in the case of a foul wind, the ship's head pointing as near the course as possible. A flapping sail usually means you are trying to sail too close to the wind, though if the sail is badly cut, or badly set, it may be difficult to get it properly filled. Sometimes a rope edge will cure a loose leech; adjusting

the halyards may help, but do not cut it about without an expert sail-maker's advice. A boat will sail " off the wind " with almost any sort of sail, but to get to windward and sail close-hauled, you do need a reasonably well-setting sail. If you are sailing a decked-in yacht, with the mainsheet made fast, and get caught in a squall, put your helm hard down, i.e. " luff up ", and the ship's head will immediately come up into the wind, and the sails flap, but by so doing the wind is spilled out of them, and the ship will right herself. As soon as the immediate danger of capsizing is over, of course, put your helm up and get sailing again. The disadvantage of this method of dealing with a squall, particularly in a dinghy, is that you lose way, and may not easily get sailing again, and the next squall may blow you backwards, and you cannot manœuvre if you have no way on your ship.

Getting Under Way.

This depends on varying conditions of wind or tide. A ship at anchor or on a mooring usually lies head to wind. In a tideway, however, she may lie head to tide and stern to the wind. Let us consider when she is lying head to wind. First hoist the mainsail, then pull in the anchor fairly fast so that there is a certain amount of way on the boat, then as the anchor comes up put your helm hard over, so that the boat heads well off the wind in whatever direction you want to go, and get the boat moving close-hauled. When she is moving properly, alter course according to where you are bound, let out your sheet if you are bearing away, i.e. going away from the wind, or go about, or carry on as the case may be.

Now consider the case when the ship is lying stern to wind. It is easiest to hoist some sail, and haul in the anchor as she sails up over it, then set your sail properly and sail in the direction wanted. If, however, you don't get the anchor up in time, and it holds her as she sails over it, she will swing round head to wind, and you must proceed as above. These can only be very general instructions as the wind and sea are never the same twice running, and by far the best way to learn is to practise often. Getting under way from a mooring is usually easier, as you can hang on to it until you have got your sails set and the ship heading in the right direction, and then let go and carry on.

Mooring.

When picking up a mooring the ideal is to arrive at the buoy with no way on the ship. This needs a lot of practice, and knowing one's own ship. Generally speaking, try to get to leeward, and then luff up head to wind, putting the ship in irons so that she loses her way as she reaches the buoy. If you try to catch hold of a mooring-buoy with too much way on you, you are likely to miss it or get pulled overboard, and in a big ship you might even drag the mooring. If you do miss the buoy at the first attempt, don't worry, for lots of people do the same, but just get your ship sailing again, and make another attempt.

Anchoring.

When anchoring, the important thing to remember is to have way on—preferably sternway, then the chain will not pull back over the anchor and trip it up. To get sternway on, luff up head to wind, and get the ship in irons, and wait till she begins to blow backwards. If you must anchor with foreward way on, then put your helm hard over one way or another to give her a sheer so that she does not drop back directly over the anchor. If you drop your anchor with no way on, the chain cable just falls in a heap over the anchor, and will almost certainly foul it. As a general rule, let out three times as much cable as you have depth of water. You are liable to drag with less. In strong winds let out more, and if she is snubbing badly a weight of some sort tied to the chain will help. Rope hawsers must be carefully guarded against chafing—tie some rag or cotton waste round chafing spots. If anchored in a tideway, your ship is not safe unless she has a second anchor out—a kedge. The line of your anchors should be parallel to the stream. The kedge warp is made fast to the cable, and the two lowered together till well below the surface of the water. It is best to lay the kedge out from the dinghy, but if you cannot, then let out your anchor cable to its full extent, heave the kedge astern as far as you can, then pull in on your cable, paying out the kedge warp as you do so, but don't pull in your main cable to leave less than three times the depth out.

Care of Boat.

Remember that it is not seamanlike to go to sea in an unseaworthy boat. So see to it that your boat is as sound as possible.

Also remember that it pays in the end to buy the best you can afford. A cheap boat may prove expensive, as if she is unseaworthy you will spend all your time and money in putting her right. On the other hand, any boat is better than no boat; but if she is in bad condition don't go too far out to sea; keep within swimming distance of help!

To test your boat for rotten wood, get a marlin-spike, or pocket knife, and jab it gently into the wood. If it sinks in easily the wood is rotten and needs renewing. The most likely and dangerous places for rotten wood are, garboard, stem, sternpost. Timbers may often be broken at the turn of the bilge. The bottom of your boat must be sound for safety. To make your boat really sound a competent shipwright is really needed, but quite a lot can be done by patching with tingles, made of copper or lead, tacked over the bad places. These tingles should be well bedded in white lead. Leaky seams need stopping with putty or caulking and painting thoroughly. A well-painted boat is less likely to rot or leak than one whose paintwork has been neglected.

To Paint Your Boat.

First clean her well and give her a good rub down with coarse sand-paper, or water sand-paper, and dry well. Give a good coat of priming, and then fill up any cracks or uneven places with putty or plastic wood. Then give a good coat of paint. When dry, rub down again lightly to get a good surface and give another coat. You should give at least two coats of paint, and if possible three. Again, use the best you can afford, but a coat of tar is better than nothing. Keep your ship's bottom free from weeds or she won't sail or motor if dirty. A good anti-fouling paint is best, but regular scrubbing will keep her clean. Do not paint or varnish in hot sun, rain or frost. Of course, if possible, do it under cover.

To Lay up your Boat.

If possible, keep her in a shed, but if you cannot, try to procure somehow a cover—an old tarpaulin or sail will do. Clean her out. A dinghy is best stored upside down. All boats should be hauled out if not in use in the winter, and protected as much as possible from the weather.

Sails.

Sails should always be dried and never put away damp or they will rot and get mildewed. If their storage place is damp, you must inspect them at least once a week, and hang them up to dry and air. Large sails are of course difficult to hang up, but they can be spread out in the sun on dry grass, or perhaps you might be allowed to spread them out somewhere in the house to get them really dry. Tanned sails keep better than untreated ones. They are heavier and not so suitable for racing or light winds, but if you can find no dry place for storage it would be wise to tan them, though even then they are better kept dry. Sails if not tanned should be mildew proofed.

When you remove your rigging, and all running rigging should be removed when laying up, it will save a lot of trouble later if you label the various halyards, &c. Rotten gear is unseamanlike, so replace rotten rope. To see if the rope is rotten untwist a bit in the middle, and if the centre strand is still looking good and sound, the rope is all right, but if it is the least bit frayed, beware of it and scrap it, if you can possibly manage to buy some new. All rope should be stored in a dry place. Any wire rigging should be rubbed over with an oily rag to check rusting. If the wire rigging has begun to fray, don't trust it.

Engines.

To lay up an engine for the winter, remove the magneto or coil, and keep it at home in a dry place. Before removing the magneto the drive should be marked, so that *when putting it back in the spring the timing will be correct.* All parts of the engine should be well oiled. The engine should be turned over once a week if possible, when a little oil in the upper chamber will check corrosion. If it is to be left for long periods without attention, fill that part of the cylinders above the pistons with lubricating oil. To do this, remove sparking plugs, fill with oil, and then replace them. Batteries, if any, should be removed and kept on a trickle charge.

Fitting Out.

When put in the water after being hauled out for some time a boat will often leak, as the wood may have shrunk. She should,

however, take up fairly soon. If she doesn't, try to find the leak and stop it. Seams may need recaulking and stopping in an old boat.

A boat should always start a new season with a new coat of paint—the old saw, " Pity to spoil a boat for a ha'p'orth of tar ", is a true one. As you re-rig your ship, see that your gear is sound. A new thinner rope is stronger than a rotten thicker one. Sheaves and shackles which may have rusted will usually react to oil. All ropes should run freely in the blocks. See that all ends of rope are neatly whipped; a frayed rope's end betrays a slovenly seaman, and incidentally spoils the rope.

Rules of the Road.

Power gives way to sail, but do not expect the *Queen Mary* to give way to you in a sailing dinghy! Courtesy is the keynote of the sea. It is easier for a small ship to manœuvre in narrow waters, so do not get in the way of large steamers. If you are going to alter course, do so in good time so that the other fellow knows. Under sail, ships with the wind behind give way to ships close-hauled. A ship on the port tack gives way to one on the starboard tack. At night a sailing ship carries a green light to starboard and a red one to port, and for large ships, a white light astern.

A steamer or ship under power carries a white light at her mast-head as well. The easiest way to memorize the rule of the road is to learn the following rhyme:

Meeting steamers do not dread,
When you see three lights ahead,
Just port your helm and show your red.
Green to green, or red to red,
Perfect safety, go ahead.
If upon your port is seen
A steamer's starboard light of green,
There's nothing much for you to do,
For green to port keeps clear of you.
If to starboard red appear
Then 'tis your duty to keep clear.
Then act as judgment says is proper,
Port or starboard, back or stop her.

You should study a nautical almanac for fuller details of the rule of the road.

General Hints.

Never go to sea without food and drink in your boat. If possible always carry a vacuum flask with a hot drink in it. You can never be sure what trick the sea may play on you, so be prepared for everything.

Be intelligent about the tide, and always be sure you know what it is doing and where it runs strongest, &c. Get into the habit of studying tide tables and charts. Don't go to strange places without charts of them. An old cancelled one is better than nothing, for the coastline changes very little, though, of course, buoys and lights alter, so you must be up to date with them. Study the buoyage system, so that you know what the various marks mean.

Don't play the fool in a boat, and in an open boat do not stand up more than can be helped, and certainly do not have more than one person standing at a time.

Treat the sea with respect and you will get a tremendous amount of sport and excitement. By all means be adventurous, but not foolhardy. For instance, to sail across the Channel with a well-found little ship, and reasonable knowledge and experience might be adventurous, but to deliberately sail through a notorious tide race " just for the fun of it ", would be foolhardy as well as unseamanlike, quite apart from the fact that someone else might have to stand into danger to rescue you. If you do not believe what the sailing directions, &c., say about tide races, try to watch one from the shore. Good seamen do not have many " narrow shaves ".

Of course, you will learn more from actual practice than any articles or books can teach you, and the way to get to know the sea and your ship is to get afloat and try her, but the written word can direct and help, so buy or borrow all you can that has been written about the sea—the sea is so varied that everyone has his own particular experience and bee in his bonnet, and you will soon find yours once you have got afloat and have had a few seasons in sailing.

MOTOR BOATS

There are many types of motor boats: twin screw, single screw, petrol, paraffin or diesel, &c. Some of these boats are driven with engines of up to 2000 h.p. each. Such high-powered craft are somewhat beyond our scope, so we will consider a small single-screw motor launch of, say, 18 to 20 ft. in length. Once you can handle such a craft efficiently you will soon be able to handle larger craft.

Motor boats can be either of the hard-chine type, with flat bottoms that plane on the surface rather than go through the water, or of the round-bilge type that go through the water. The former are easier to drive at high speeds, but are not such good sea boats as the latter. A hard-chine boat is very awkward to handle at low speeds as she has no grip on the water.

A motor boat is steered either with a tiller or a wheel. Steering with a wheel is like driving a car. The ship's bow moves in the same direction as the wheel. When steering with a tiller remember the ship moves in the opposite direction to the tiller.

The normal gear box fitted to a marine engine consists of forward, neutral, and astern gears. There is no independent clutch as in a car, and no first, second, and third gears, so all you have to remember is that if you push the gear lever forward the boat will go ahead. If it is pulled right aft it will go astern, and if it is left in between these two gears the propeller will not turn, and she is in neutral. Occasionally in an auxiliary yacht there is no reverse gear, in which case very great care is needed when coming alongside or picking up moorings, &c.

When lying alongside a jetty you should move your wheel to steer away from the quayside at the same moment that you put the engine into gear. That is unless you want to move straight ahead at once. If her nose is in between other boats you may have to go into reverse to get her away from the quay, in which case you will have to see that her rudder is pointing in the direction in which you want to go, but this must be done gradually, otherwise the boat swings too quickly and you are liable to hit something. When you are clear of all boats and obstructions you can push the throttle forward so that the boat is moving along as you want.

Anchoring under Power.

Approach your anchorage slowly, allow your boat to lose way just beyond where you want your anchor to lie, then give her a touch astern, and as she gathers sternway drop the anchor and pay out the cable. Always try to approach an anchorage against the tide.

When picking up a mooring under power, again approach slowly. Try to lose way just at the mooring. If you are going too fast and want to slow down by putting into reverse, remember that if the propeller is turning anti-clockwise, the stern of the boat will turn to port and the bows to starboard, and vice versa for a clockwise propeller. So be sure you know in which direction your propeller, and therefore your ship, turns in forward and reverse gears. It is usually easier to err by losing way before the mooring, and giving a touch ahead, than by overshooting the mark and having to go astern. Just how far your boat carries her way depends on her shape, the wind, and the tide. You must find that out by practice. As a general rule, a short stocky boat loses way more quickly than a long lean one.

Getting Away under Power.

When getting under way from a mooring, remember to keep your propeller clear; either give her a good sheer away as you go, or bring the mooring aft before letting go, or else drop astern before getting under way properly.

When getting up the anchor, motor gradually up over the cable, hauling in as you go. When the cable is taut up and down, a touch forward or astern, or a sheer one way or another will usually break out the anchor for you. Remember that when you put the boat into forward gear the ship's head will swing according to the direction in which the propeller turns until she gathers sufficient way to answer the helm. The ship's head goes to port when the screw turns anti-clockwise, and to starboard for a clockwise turning screw. In fact, the opposite to what happens in reverse.

Behaviour.

Do not get the name of "marine hog". In other words, be courteous afloat. A motor boat must give way to a sailing boat, and let the sailing boat know in good time what you are doing. Remember, a motor boat is usually noisy and fast and leaves a wash. So do not go charging up and down a crowded anchorage at full

speed. Always slow down when passing a pier where boats are moored, and go slow past ships at anchor and small dinghies. Your wash might capsize an overloaded dinghy or cause an anchored yacht's meal to land on the cabin floor. By all means go flat out when the channel is clear, but it is not good for any engine to be driven at full speed indefinitely. You will find by experience your most economical and comfortable cruising speeds.

General.

Always carry enough fuel with you and some to spare. Also carry oars, as engines sometimes break down, and a motor boat is quite helpless then. All motor boats should carry a fire extinguisher. Petrol fumes are heavier than air, and there may be fumes in the bilge, so be careful about naked lights, and use a torch to examine your engine's inside. You cannot be too careful about petrol fumes and lights. Petrol vapour is extremely explosive.

The motion of a motor boat in a seaway is quite different from that of a sailing ship. It is much more violent and rolling. In fact, many motor boats carry a small sail to hoist when passage-making, as it helps to steady them a bit. Do not try to drive your ship into a sea; you will find she will be much easier if you slow down and ride the seas rather than drive through them. If your course is parallel to the waves, you may have to alter course, so that you cross them, as the motion may be so violent that the motor boat might roll under.

Before going to sea you should thoroughly understand the workings of your engine, and where all its various parts are situated. Different makes of engines vary.

Troubles.

If an engine will not go the fault must be either ignition, compression, or fuel supply. Test compression by turning over by hand. Test ignition by taking out the plugs, their leads attached, and turning by hand there should be a spark. The body of the plug must touch some metal part of the engine, and occasionally a plug will spark in the open when it will not under compression. Test the fuel by unscrewing the petrol pipe. When an engine suddenly cuts out it is usually the ignition. If it splutters or races, it is usually the fuel supply. If it misses intermittently, suspect faulty plugs or worn magneto points. Here are a few tips for starting an obstinate engine:

1. Try doping the cylinder with petrol.

2. Try partially stopping the air intake.

3. Take out the plugs and heat them on a stove, or you could fill them with petrol and light them, but that is rather dangerous; be careful not to burn your fingers when replacing the hot plugs.

4. If the engine is hot and will not start, the mixture is probably too rich. Close the throttle, open priming tops if any, and give the engine a dozen or so turns by hand. ,You will find that all engines have their pet irritations and characteristics, which you will learn about as you know each one in turn.

A common trouble with motor boats is the fouling of the propeller, either by rope or weeds. If you are lucky you may be able to clear it by fiddling about with a boathook, but if not you will have either to go overboard, armed with a sharp knife to cut away the obstructions, or else beach the boat. You will understand, of course, that if the propeller is not clear it cannot rotate, so that if the engine will run in neutral, but stops when put in gear, suspect something round your propeller. Do not try to force a foul propeller by continually putting her into gear, for you will only risk bending it. If you run aground in a motor boat you are likely to damage the propellers, so be sure to examine them after grounding. They are also liable to damage if you hit anything such as floating driftwood.

SHOOTING

" *Lock, Stock and Barrel* ".

This traditional phrase for the whole gun aptly described the three separable parts of a muzzle-loading gun one hundred years ago. In a breech-loading gun the three separable parts are: (1) Stock and Action, (2) Barrels, and (3) Fore-end. The locks are built into the action. The fore-end is clipped to the barrels and acts as a link between them and the action. The barrels control the conversion of explosive pressure behind the shot into directed velocity of the shot. The locks deliver a blow to set off the cap which fires the cartridge. The action includes the locks and the means of receiving, securing and releasing the cartridge. The stock is shaped to make the gun easily handled in directing the barrels, and in taking the recoil.

While a shot is flying through the air between the firer and his objective, its effectiveness depends on three things—its weight, speed and direction. If its direction is right it will hit its objective. If its weight and speed are great enough it will be effective. Every moment that the shot is in flight its direction is changing downward due to gravity; therefore, the shorter its time in flight, the less is the change in direction. (In other words, high velocity gives flat trajectory.)

To send a shot with greater force than human muscles can provide, we put behind it a very high pressure created chemically by changing a small quantity of solid matter into gas. Those solids which become gases suddenly are gunpowders or explosives. Many varieties of explosive are now used, with different degrees of suddenness and different ease of setting off; but the original gunpowder, now called " black powder ", was the only one known till about 1870. Until nearly the end of the nineteenth century all firearms were muzzle-loading. Powder (carried loose in a flask) was poured into the barrel, followed by wadding, and rammed. The shot or ball was then rammed on top, with more wadding to keep it in place. For nearly one hundred years after foreign armies had muskets, the English bowmen could beat them in the field for speed of fire and range.

Very few muzzle-loading guns are now in use, and shooting to-day is done with " cartridges ", each of which is a self-contained package including the shot, wads, powder, igniter, and a case sealed to prevent gas pressure leaking at the joint of the gun. The use of cartridges became possible with the introduction of the breech-loading gun.

" Shooting " generally means shot-gun shooting, unless otherwise specified, as stalking or target shooting, of which more later.

Shot-gun shooting is only done at moving game, birds in flight being the most acceptable target. The chance of hitting a bird in flight with a single ball would be remote indeed, although it has been done. The shot-gun is loaded with a charge containing usually about 200 pellets, which spread over a cone of fire, and so give the firer some latitude in which to make a hit.

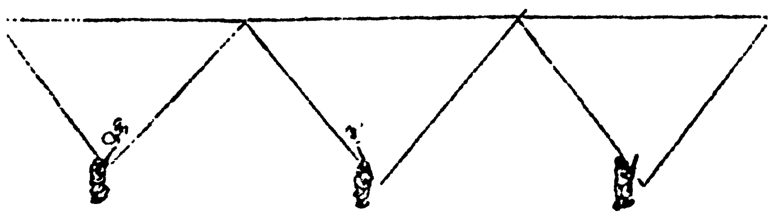


Fig. 1.—Position when at butts or walking in line

Safety.

Carrying a loaded gun involves great responsibility. It has power to kill without effort, and this power must be treated with great respect. No firearm should ever be loaded until needed, and immediately you stand down you must unload. It is also wise to unload, or at least to open your gun, when crossing fences or ditches. No gun, *loaded or unloaded*, must be allowed to point at or near any man or dog within 200 yards.

If guns are in line, either walking or in butts, no firing must be done down the line. Each gun has its restricted sector in front and behind, in which shots may be taken (see fig. 1). Change from front to behind by swinging the gun overhead and not around.

On open, flat ground the safest carry is with barrels pointing down and forward at about 45° slope, either held in both hands or with the forearm under the action (see fig. 2*a*). Practise these positions and from them a quick mount to the shoulder, including putting the safety catch to " ready " while mounting.



a *b* *c*

Fig. 2.—Carrying: correct

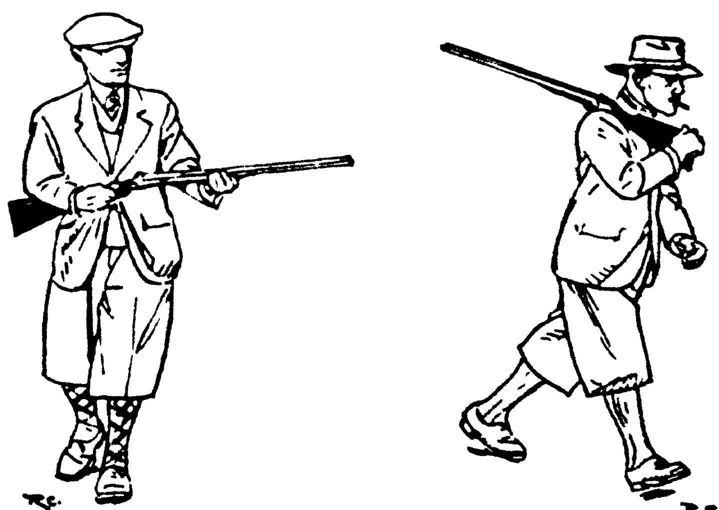


Fig. 3.—Carrying: incorrect

On rough ground, in heavy undergrowth, or behind cover, the "muzzle-down" position is not so good as "muzzle up" but the gun must be kept almost vertical, either on the shoulder, with the toe forward (fig. *2b*), or in both hands with the barrels upward near the left side of the head (fig. *2c*). This last is a good "ready" position from which to point a shot in any direction.

A shooting party is one place where contempt of danger will bring contempt on him who shows it, and precautions taken to the extent of fussiness will be generally approved and will create a feeling of confidence.

Shot-guns and Cartridges—Bullets.

Shooting at birds on the wing, or at ground game on the run, is done with a shot-gun which fires a charge of small pellets. The most usual gun is a double-barrelled 12-bore. The "12" is the traditional measure of the bore and is the size of a round lead ball weighing $\frac{1}{12}$ lb. The other bores of shot-guns are similarly described as 4-bore and 8-bore, being large guns for wild geese, &c.; 16-, 20- and 28-bore are small guns (usually), for handling by small people. Smaller than the 28-bore is the "Fourten", which is the only bore known simply by its diameter (·410 in.).

Breech-loading guns, which have been in general use for about seventy years, can be opened to allow a loaded cartridge to be put into the rear end of the barrels. This cartridge contains cap, powder, wadding and shot. The cap, when struck by the striker, sends a flash into the powder. The powder becomes a large volume of gas, which thrusts the wad and the shot forward along the gun barrel, from which they emerge at a speed of about 1100 ft. per second.

A usual cartridge for 12-bore guns is loaded with $1\frac{1}{16}$ oz. of shot. This gives 181 pellets of No. 4, 234 of No. 5, or 287 of No. 6. The larger pellets keep their killing velocity over a longer range, but owing to their smaller number have a less chance of hitting a vulnerable spot such as the head or neck of a bird. No. 6 is usual for partridges, No. 4 for hares.

It is important to learn to judge the distance at which to shoot. Shots too far out are likely to wound without stopping. Shots too close spoil the game for the table. Thirty yards is best. At that distance the shot is spread over a circle of about $2\frac{1}{2}$ ft. diameter, and should bring down anything, the head of which is in that circle. At less than 20 yd. the game is likely to be too much smashed up.

Beyond 40 yd. a pellet in the head will kill, but the chances of wounding and losing are greater. When considering the safety of men, 200 yd. is needed to take all the sting out of a charge of No. 5 shot. The spread of the shot is necessary to hit a moving bird or rabbit, because it is not humanly possible to hold an accurate sight on such a small target in motion. The effect of the 30-in. spread of the shot on the accuracy required is as if the target were enlarged to 30-in. in diameter.

For certain purposes a single bullet is better than a charge of small pellets. Sitting rabbits, pigeons and rooks can be approached to within 50 to 100 yd. and can be killed at such distances by small-bore rifles, when time can be taken to use their accurate sights. A rifle bullet is elongated to present only a small air resistance to its weight, and so keep its velocity for a longer distance than would a ball of equal weight In order to keep its nose pointed forward while in flight, it is made to spin. The rifling is a system of spiral grooves inside the barrel. The bullet is forced by the pressure of the fired powder into the rifling, which " engraves " the bullet and makes it rotate, so that it has enough spin when it reaches the muzzle to keep its alignment in flight.

The Mechanism of a Gun.

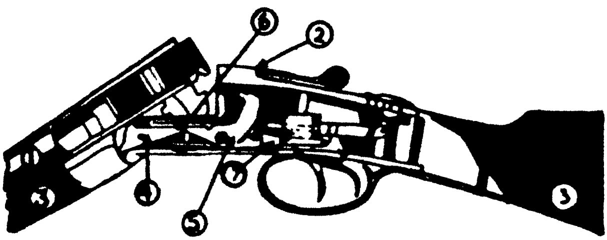
The lock gives the necessary blow to the cap when the trigger is pulled. It consists of striker, hammer, mainspring, safety sear, and trigger, besides a box or a plate to keep them in position. In a " hammer " gun the hammer is entirely outside the plate, and has a thumb-piece by which it can be pulled back to compress the spring. When it is pulled back far enough a notch, called the " bent ", clicks over the nose of the sear, which holds the hammer " on cock ". When the trigger is pulled it tips the sear out of the bent and allows the mainspring to thrust the hammer forward on to the striker, the inner end of which is against the cap.

The arrangement of these parts varies in different types of guns, but the function of each remains the same.

In a hammer gun the hammer is pulled back by hand into the cocked position. Many hammer guns have a safety device called a " half-bent ", into which the sear catches if the hammer is pulled half-way back. The only release from the half-bent is by fully cocking the hammer, because the half-bent is shaped to prevent the sear from being released by the trigger.

In a "hammerless" gun, the hammer is inside the body of the gun, has to be cocked automatically by opening the gun, and cannot be put on half-cock. Another type of safety device has to be used, usually a sliding bolt, which prevents the sear from being disengaged until the thumb-piece has been pushed to "ready" position.

The barrel of a shot-gun is a steel tube bored to fit the wadding in the cartridge, and of even bore for most of its length. At the rear or breech end the bore is enlarged into the "chamber", which contains the cartridge. The outer diameter is also larger at the breech end, to give the necessary strength to hold the pressure of



Mechanism of typical hammerless gun

1, Barrel. 2, Action body. 3, Stock. 4, Cocking bar. 5, Hammer. 6. Mainspring. 7, Sear.

the gases before they have expanded. This pressure gets less as the wad moves forward, and the barrel can be much thinner towards the muzzle, where the pressure is much less. The forward half of a gun barrel receives more stress from external bumps than from internal pressure. When a barrel is "bulged" from the inside, the fault is due as a rule to the shot having struck something lying in the barrel.

It is usual for the bore of the muzzle to have a slight tapered reduction of about 10 to 30 thousandths of an inch in at least one barrel. This is called "choke". It has the effect of reducing the spread of the shot in flight, so that longer shots can be taken without loss of density.

Barrels were usually 30 in. long when black powder was used, because the powder required 30 in. of barrel in which to develop its power. Modern powders can impart full velocity to the shot in 24 in. A 24-in. barrel is not so easy to point accurately or to control. Barrel length is therefore a matter of individual choice for effective handling.

The weight of a 12-bore double-barrelled gun is usually about 6½ lb. Guns much heavier are tiresome to carry, and for most people are slow to bring on aim. Guns much lighter than 6½ lb. give excessive recoil, and this can be much more tiring than carrying a few ounces of extra weight. Recoil is due to the gun being forced back with the same momentum as the shot is forced forward. A light gun can be fired with comfort only with a light charge of shot. 6½ lb. for $1\frac{1}{16}$-oz. shot is close to a ratio of 100 to 1, which means that the gun recoils on firing at $\frac{1}{100}$ of the muzzle velocity of the shot, i.e. 11 ft. per second.

Gun barrels have a boss attached, which is used to hook on the action. The fore-end is also held in place by a forward "lump" or loop. When the breech of a hammerless gun is opened and closed, the fore-end engages projections from the action which act as levers to put the hammers into the cocked position.

The gun is kept closed by a bolt or "grip", held in the closed position by a spring, and released to open by an external lever.

Shooting Parties.

This kind of shooting comprises either "walking up" or "driving", depending on whether the guns walk to the game, or stand in selected positions while beaters drive the game towards them. It is usual for the season to start with walking up, until the birds become so wild that they get up out of range. Later, driving brings the birds to stationary guns. Every gun must keep to his own position and must also keep in touch with his neighbour's position, so that each may know his zone of fire for safety and for courtesy. If a bird is in front of your neighbour, let him shoot it.

Especially in walking-up, co-operation between the shooters and their dogs is essential for pleasure. If you have a young dog which may get out of control, do not take him with you where he may spoil the day for the whole party.

On a large shoot there will usually be a gamekeeper on the spot, who acts with or for the host as master of the operations. In such circumstances the guest needs little fieldcraft, and is expected to kill a reasonable proportion of the game passing his zone of fire. The keeper has made a life-study of the habits of game, and his arrangement of the day's campaign involves consideration of many conditions. Some parts of his ground may be left undisturbed as a temporary sanctuary for birds not in the day's programme.

The direction of the wind may influence the direction of each beat, so that as many birds as possible stay within the marches. The disposition of the guns should give a fairly equal distribution of chances throughout the day, although certain known guests may be allotted a favourite position on a known beat. At the end of a strenuous period of walking in line over several beats, it may be that birds have been seen taking to a favourite small cover, and a converging movement on the cover gives the party a lively wind-up before refreshment In converging movements shots must only be taken overhead or going away outside the guns, because any forward shot is dangerous.

Birds are usually shot when 25 to 40 yd. from the gun. They usually travel 15 yd. in 1 second, hence in something less than 1 second the shooter must get his gun up and fire. To do this successfully he must practise the necessary motions (with an unloaded weapon).

Driving is organized to bring as much game as possible into range of stationary guns in prepared places of concealment. Beaters are hired to " draw " a part of the ground after the guns are in position. Local experience of the habits of the game under all conditions of wind and weather is necessary to ensure that game will go to the guns. This general scheme applies to drives for grouse, partridge, hares and pheasants, but the stances and type of ground drawn vary greatly. In driving, a shooter sometimes uses two guns, having a loader to hand him a loaded gun in exchange for a fired one with as little delay as possible (see fig. 4). The acme of success in this type of shooting is to bring down four birds out of one covey while they fly at full speed.

The most independent way of shooting is to go out alone, preferably with an obedient dog, following your fancy as to probable places for game. A dog will usually put up anything within ten yards of you, and can be sent into particularly thick cover to drive out the lurking bird or beast. Without a dog it is sometimes possible to pass within a few feet of a close sitting bird or rabbit without seeing it.

A party of guns spaced about 30 yd. apart, and walking in line, will see much more than each would see alone. In close cover, such as fields under root crops, the spacing has to be reduced, either by bringing guns closer together or by filling spaces with walkers. The line must always be kept straight, because each gun

fires in a restricted sector in front and behind, and a badly kept line puts somebody in a danger zone. Each member of the party must be constantly alert (1) to maintain his position between his neighbours, (2) to see any signal for change of direction given by the leader of the party, (3) to watch and listen for game in his own sector, (4) to mark carefully the position of birds dropped in thick cover.

Many farmers are glad to have a visitor with a ·22-in. rifle to attack their pigeons, rabbits, and sometimes also their rooks. This



Fig. 4

form of shooting is sometimes available when no other can be had. There are various ways of making burrows less tenable, so that rabbits will " sit out ". Pigeons are interesting to watch for from a hide. The possession of even a ·22-in. rifle, by the way, involves police permission, whereas that of a shot-gun does not. A shot-gun is quite as lethal as a ·22-in. rifle at short range, but whereas a shot-gun is harmless at 200 yd. a ·22-in. rifle is dangerous at 1 mile!

Deer stalking can only be for a few people, because it takes about 15 square miles of mountain to accommodate one shooter. It is, however, the most energetic form of hunting in Britain. Usually

the stalker has a score of years' experience of his piece of country, and uses all his local knowledge and the wiles of winds, echoes, &c., to conduct the shooter to within 100 yd. of a selected and unsuspecting deer which would normally never allow a human being within half a mile.

So far, we have referred only to shooting at natural targets. Target shooting, however, is a very necessary preparation for real shooting, and for this purpose should be done with the sporting rifle just as it is to be used in the field. The result on the target should indicate what you may expect to hit with that rifle at any distance. There is another form of target shooting, the object of which is entirely competitive, and for which no other object is in view than the extremely accurate placing of shots on a target. This subject is outside our present scope.

Air-guns and Rifles.

Many boys have their first introduction to shooting with an air-gun. The power of an air-gun is limited, because only a small part of the energy required to compress the spring is available in the discharged pellet. The more powerful air rifles can kill or stun a rabbit at about 20 yd. Pellets are cheap and air-guns are comparatively silent. The safety precautions for firearms should be observed as strictly with air-guns as with more powerful weapons. Air-guns have inflicted fatal injury.

The usual air-gun has a strong spring, which is compressed by a lever, which is sometimes the barrel of the gun. The spring is held compressed by the sear until released by the trigger. The front of the spring pushes a plunger or piston fitted with either piston rings or a leather cup washer such as one finds in a bicycle inflator. The plunger travels into a closed cylinder when the spring expands, and air is compressed in front of it. The air escapes through a hole leading into the barrel. The pellet lies in the rear end of the barrel and is blown out through the barrel by the blast of air. Smooth-bored air-guns are suitable for darts or for small cup-shaped pellets, the light skirt of which keeps their nose to the front. Rifled air-guns give better results with heavier pellets of the waisted shape.

The Care of Firearms.

In recent years great progress has been made in reducing the amount of corrosion caused in gun barrels by the residue from powder and cap charges. In some cartridges the components are so well neutralized that the inside of barrels needs only the same cleaning as the outside—a rub down to remove moisture and dust, followed by a smear of a *protective* oil or grease. (*Note.*—A good lubricant is not usually a good rust preventative.)

The inside of barrels should be kept bright and should be inspected from time to time, when not in use. If unsuspected corrosion is allowed to develop in a barrel, it can easily get beyond control and ruin a gun or rifle. The sooner you clean the barrel after firing, the less work it will need. After it is cleaned and oiled, remember to have a look at it a week later, to see if it is keeping well.

A cleaning rod of correct size, with either pieces of cloth or gun tow, is the best cleaning tool. Each cleaning should always start with fresh stuff, and no dirty bits should be allowed to accumulate.

The outside of the gun can be wiped over with a slightly oily cloth, which should also be used after every handling, to remove any palm prints from the steel. Sweat is acid, and finger-prints in rust develop readily.

If your gun has been out in rain, it should be dried thoroughly before oiling. If it has been very wet, and you suspect that water may have got into the locks, it is wise to have the locks inspected. Stripping for inspection and overhaul should in any event be done at least every two years, to remove any rust or gummy oil, and to polish and relubricate all parts. This is a job for the gun-maker.

The most frequent serious casualty to a gun is the breakage of the stock at the " small " or grip, where the wood is reduced to give comfort to the right hand. The wood at this point also has its strength reduced by unavoidable insertions of metal. Stocks can stand a very large bump end-on, as they are meant to do in taking recoil, but they are very weak if bumped sideways. Causes of breaking stocks are (1) pushing a dog away, (2) killing a rabbit, (3) falling on the gun, and (4) dropping the gun—e.g. off the roof of a car. Therefore, treat your stock with great respect!

SWIMMING

Confidence Lessons.

Do not be too ambitious to start with. Get to feel confident in the shallow end of the pool, and enjoy yourself in the company of others of your own age by holding on to the rail and jumping up and down, allowing the water to come over your shoulders. You will be pleasantly surprised how much confidence this will give you.

Now leave hold of the rail, all take a firm grip of each other's hands and form a circle, and start jumping up and down, the leader shouting " One, Two, *Three* ", which can be the signal for everyone to duck their heads under the water. You'll find it isn't quite so bad as you expected.

Separate now and, standing with legs apart, try putting your face in the water as you bend forward. At first the tendency will be to tense your muscles, but try again, eyes closed, mouth natural, and gradually you will find yourself able to do it quite comfortably.

Now try opening your eyes under water to look at your toes. You will not do so to start with, but you will with practice. The eyes will soon get accustomed to the water, so do not be afraid.

If you find difficulty in opening your eyes to look at your toes, try placing a coin in the shallowest part of the pool, and see if you can pick it up. The natural buoyancy of the chest tends to make it difficult to reach down, but repeated attempts will have their reward.

Gliding is the next part of your confidence lesson in the water. Back to the railing, place your arms in front, in line with your shoulders, and lean forward, giving a slight push with your feet from the side of the pool. The tendency will be to glide forward. The fact that you are in shallow water should give you enough confidence to let your feet leave the bottom of the pool, but should you feel nervous keep one foot on the bottom until practice gives you courage to venture with both feet up. Gliding after all is simply stretching yourself in the water.

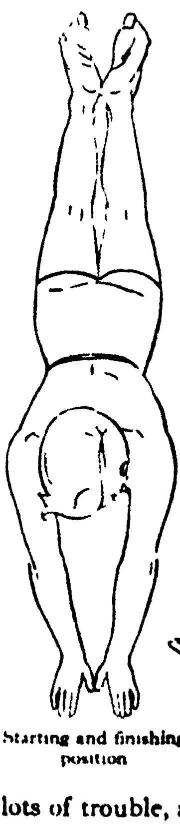
To give yourself more confidence, try pushing off the side of

the pool towards the outstretched hands of a companion. It is much more fun, and you will be amazed at the confidence it brings. Any danger of your sinking will be counteracted by the fact that there is someone ready to grasp your hands and pull you to your feet.

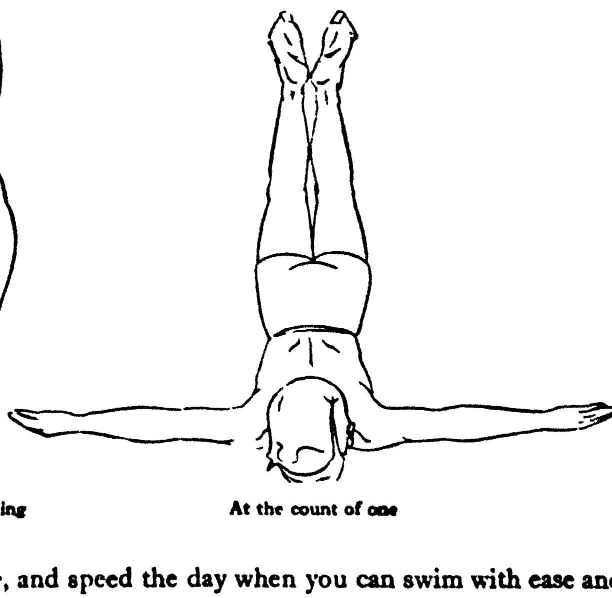
The Breast Stroke.

" Know your stroke perfectly on dry land before you go into the water " is a good maxim in swimming. And because I consider it the foundation of all swimming strokes I strongly suggest non-swimmers concentrating on the breast stroke.

Practise the correct movements in the seclusion of your own bedroom, if you wish; but whatever they are you must know what you should do when you get into the water, and you will save yourself



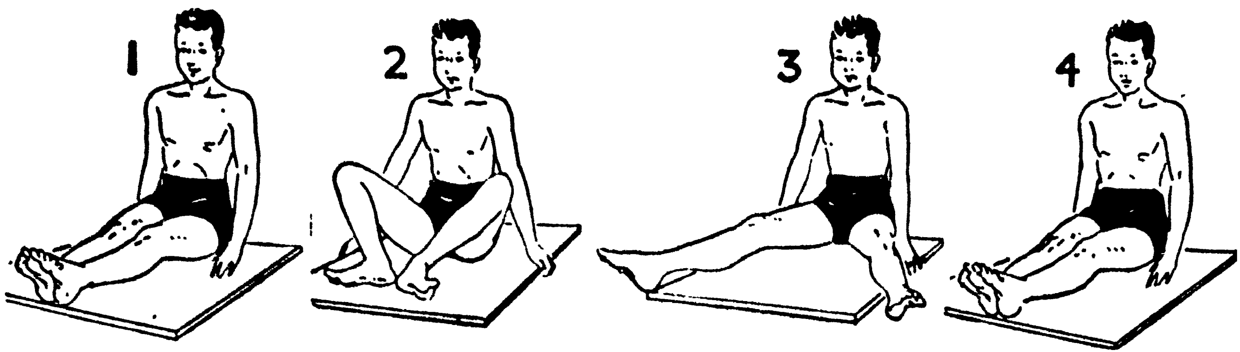
Starting and finishing position

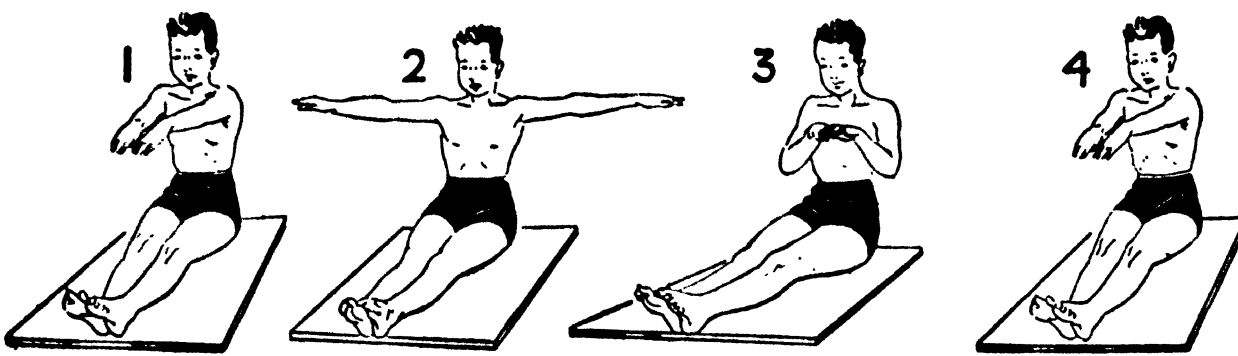


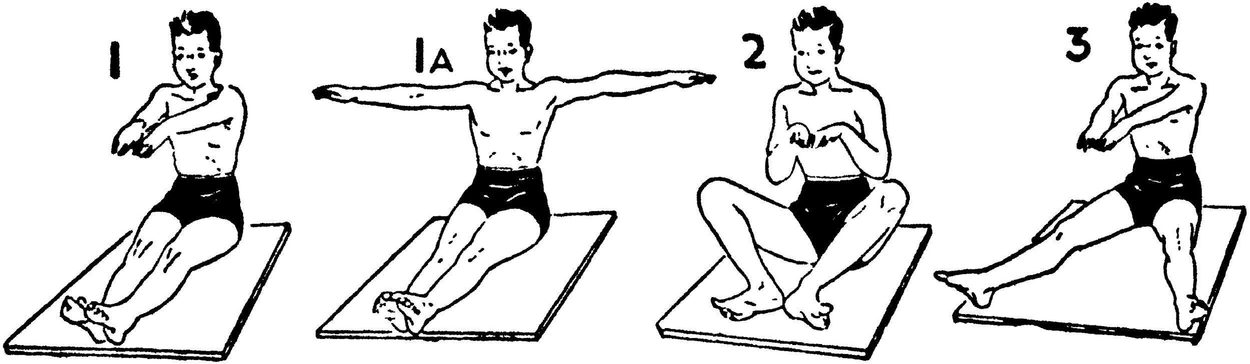
At the count of one

lots of trouble, and speed the day when you can swim with ease and grace.

A course of lessons under a fully qualified instructor will undoubtedly reap a rich reward, but these hints are primarily for


1
2
3
4


1
2
3
4



The top row of figures illustrate the breast stroke, leg action, as follows:

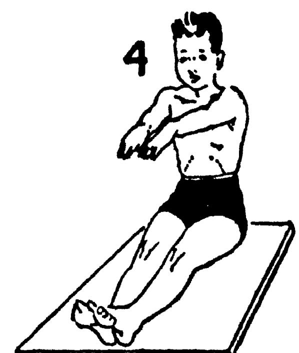
(1) Starting position;
(2) Heels together, bend knees wide apart;
(3) Kick out wide;
(4) And bring legs smartly together.

The middle row of figures show breast stroke, arm action only, as follows:

(1) Starting position;
(2) Bring arms round in line with shoulder;
(3) Elbows well tucked in to side, hands under chin;
(4) Push arms straight in front, back to starting position.

Third row of figures and figure 4 illustrate the arm and leg stroke combined:

(1) Starting position;
(1a) Bring arms round to side, in line with shoulder;
(2) Combined movement of arms and legs;
(3) Push arms straight in front and take a wide circling kick with the legs;
(4) Back to starting position.

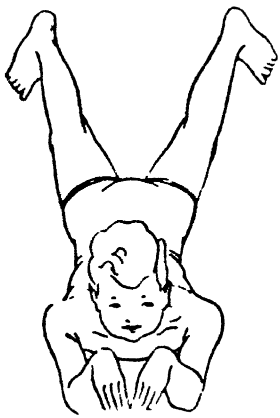


young people who are left pretty much to themselves, and who have not the opportunities for expert tuition.

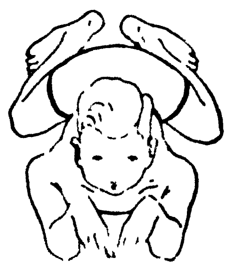
Think of the breast stroke as an easy, stretching exercise, with the legs as the main propelling power, though later both arms and legs play an equally important part. Jerkiness of any kind is to be avoided, and the thought uppermost in your mind should be a gentle rhythmic propulsion through the water.

Start with the arm stroke, both arms outstretched in front of head, in line with shoulder, thumbs and fingers touching, palms downwards.

At count of *One* part the arms and bring them round almost to shoulder line, *not* beyond.



Position half-way through third movement



Count of two

Two: Bend elbows so that they are touching, or almost touching, your sides, backs of hands immediately in front of chin, thumbs and forefingers touching.

Three: Stretch the arms straight in front to resume the position you were in at the count of *One*, thumbs and forefingers still touching, and observe a definite pause.

Repeat the arm drill slowly as above, remembering that it is not necessary to turn the palms of the hands outwards, which, in beginners, tends to pull the face down in the water.

Now sit on a stool or the floor and practise the leg movements.

First position is legs straight in front, feet and heels together.

At count of *Two* open your feet, heels together, toes pointing outwards, and bend knees outwards by drawing heels up, keeping heels together and on the floor.

Three: Swing legs wide apart and return to the first position

without a pause. Remember, the action is a gliding one, with the legs going as widely apart as possible, and returning to the closed position, where there is a definite pause.

Gliding Movements.

I told you the breast stroke was a gliding movement in the water. That is why the pause at the *completion* of the stroke is so important. The legs being brought together force the water away when closing, and provide the power for the glide.

Isolation of the arm and leg movements is always advisable to start with, and they should be practised so that you can do them almost mechanically. Only when you feel confident that you can do both separately and confidently should the combined movement be attempted. For this is the most difficult part of breast-stroke swimming.

Lie on the floor or across a stool (it doesn't matter which, so long as you have room to move arms and legs) and try to combine the arms and legs.

Adopt the starting position, with arms fully outstretched in front of head, thumbs and forefingers touching, palms facing downwards, legs stretched full, and heels touching. The head to be comfortable, eyes looking straight in front.

At count of

One: Bring arms round in line with shoulders, breathing in through the mouth.

Two: Elbows bent to sides, hands almost touching the chin, draw heels up and bend knees outwards.

Three: Stretch arms straight in front and swing the legs wide apart and close smartly, taking care to hold hands in front till the legs are closed, in which case you are back to the normal starting position. Here a definite pause is observed, to allow for the glide; and then the movement is repeated to the same count of *one*, *two*, *three*, *pause*.

Breathe in through the mouth as the arms come round in *one*, and out through the mouth at the count of *three*, when the arms are pushed in front, away from the chin.

Remember that *one* is a slow movement, *two* and *three* are quicker movements.

Only when you have mastered the movements to the various counts should you experiment rhythmically, taking care to pause at

three before resuming from the starting position again. Repeated practice will convince you that what appeared difficult to co-ordinate at first is not really quite so, if you concentrate on what you are doing until the whole stroke is almost a mechanical movement.

Swimming with Support.

Feeling happy about what you have to do you may now enter the water and, with a companion to support you either with one hand under the chest or holding your chin in the cup of his hand, see what happens.

Try not to concentrate too much, the usual fault with learners. Without realizing it you will bend the head back sharply, putting a strain on your back muscles, which is bound to exhaust you and hinder your progress. So relax and endeavour to adopt a natural stretching position. Persevere, and improvement is sure to come.

Do not try to overdo the practice—twenty minutes to half an hour should be sufficient each day, your " walking " assistant increasing the distance each time, until, without realizing it, you find yourself swimming without the helpful support.

If the co-ordination of the arms and legs is too much for you to start with, you will have to isolate the movements in water. This is best done by walking in the shallow end of the pool, shoulders slightly submerged, counting the movements of the arm stroke to yourself. Similarly, the leg movement can be done by having your back to the side of the pool, and grasping the rail with your hands. If this is difficult, get your companion to hold you up with one hand in the small of your back.

A variation of the leg movement is to grasp the pool rail, with your face to the wall, and, with one hand supporting yourself against the side, practise the leg action at your convenience. But the advantage of having your back to the wall is that you can watch the movements of the legs and make any improvement you think necessary.

It is better to start to try to keep your head clear of the water, so as to allow freedom for breathing.

If you fail to obtain any benefit from the quick closing of the legs when actually performing the full stroke you are (i) either kicking too vigorously, or (ii) not observing the pause at the completion of the movements.

Movement in the finished stroke is, of course, continuous and perfectly rhythmical; but the pause *must* be observed at the count

of *three*, otherwise the feature of the whole stroke, the glide, cannot be obtained.

Once mastered, the breast stroke is extremely graceful, and certainly the most useful stroke in sea swimming.

The Crawl.

The ability to swim an attractive and fast crawl stroke is undoubtedly the ambition of most swimmers. And here again isolation

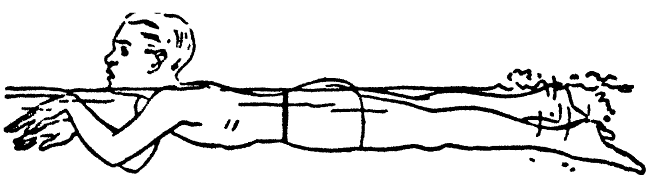


The crawl: breathing through the mouth

of arm and leg movements must be the prelude to co-ordination if success is to be obtained.

Try the legs first. Adopt a dog paddle attitude in the water, with the legs almost touching and fully outstretched behind you, and, swinging the legs from the hips in a downward and upward movement, try to cover a distance of five or six yards.

The movements of the hands up and down as a dog swims will



The crawl: practising the leg kick using dog paddle

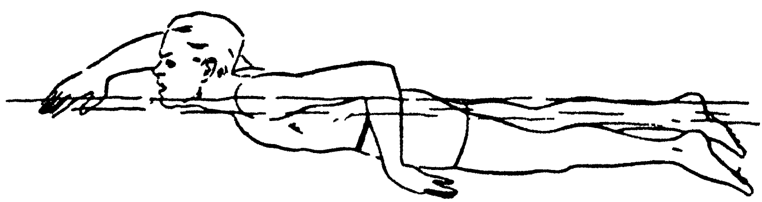
maintain your balance in the water, while the legs, kicking from the hip without bending the knees, perform a thrashing action that can be increased or decreased in speed at will. The tendency will be to kick too deeply, perhaps, but this is easily remedied if you think of the legs as the propeller part of the stroke, and that the speed of the upward and downward movement does in fact control how fast you are swimming.

Now try the arm movement separately. Walk in the shallow end of the pool, alternately placing each arm slightly in front of the

head, in line with the shoulder, and, fingers closed, hand slightly cupped, exerting pressure immediately the hand touches the surface of the water.

Do not reach out too far with the arms; it upsets balance and the shoulders droop. Remember, the arm action above the water is relaxed; underneath it is firm, pulling until the elbow is forced to break the surface first. It is not a deep pull, neither is it too shallow. Practice alone will tell you the best position for your particular style.

Breathing will be difficult to start with, but once mastered it is half the battle in becoming a proficient crawl swimmer. As the left arm goes forward lean the face slightly in the water and blow



Crawling for the first time

out through the mouth. As the left arm goes to the side the right arm goes forward, and when this arm has almost reached the side, turn the head smartly to one side, and, opening the mouth, take a deep breath of a good intake of air. Breathe on whichever side you feel most comfortable.

Style is worth aiming at in all strokes, particularly the crawl, so do not attempt long distances until you are quite certain that you have got the right stroke. Distances of twelve to fifteen yards are sufficient to start with, with a rest between each stage.

Back Crawl.

The back crawl, a development of the old English back stroke, has become extremely popular in recent years, and has made remarkable headway in speed and style.

To learn the back crawl from scratch it is again best to isolate the leg and arm movements before attempting the full stroke. Start with the leg kick. Lie on your back in the water and, kicking from the hip and not bending the knees too much, start an upward and

downward thrash of the legs in a similar manner to the front crawl. This will be difficult at first, but will become easier with practice.

The arm stroke can be bent or straight, depending on the swimmer's physique, but generally a bent arm is easier, allowing for more relaxation before the pull under water. Straight-arm swimming invariably causes a strain on the muscles, and tires the swimmer more than is the case with the bent-arm style. However, you will be able to experiment and find what is most suitable to you.

Lie back in the water, and, while the feet are keeping up a narrow thrashing movement, start to raise the right arm straight above your head, palm to the front, while the left arm remains by your side. Then, when the right arm, palm of hand turned to outside, is about to enter the water in front of your head to start a pulling motion under water, the left arm leaves the side of the body to perform a similar action.

The pull is fairly deep, but care must be taken not to overstretch when the arm goes to the rear, otherwise balance will be upset. The pull, of course, is done with the palm of the hand. At the finish of the pull to the front of the body care should be taken to see that the elbow is the first part of the arm to leave the water.

The advantage of the back crawl is the uninterrupted position for breathing, and the fact that you can cover long distances without any undue effort, thanks to the rhythm of perfect co-ordination between arms and legs.

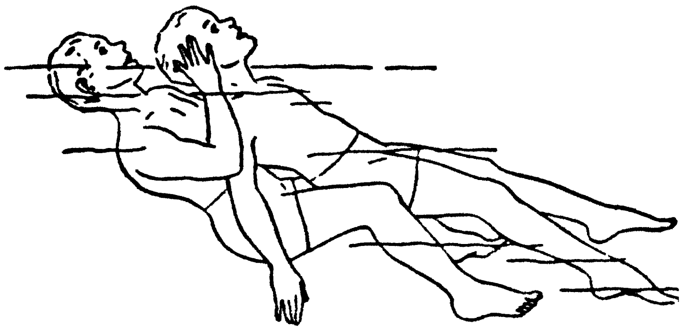
Life-saving.

Even a good swimmer with no knowledge of life-saving methods would find difficulty in rescuing a person from drowning, so the importance of how best to tackle the problem of the bather in difficulties should be obvious to all of you. Most important of all, you should know how to release yourself from the clutch of a drowning man.

When going to the rescue of a drowning person try to approach him from the rear, so that he is unable to grip the rescuer. Once in the grip of a drowning man it is very difficult to release oneself. But if you keep your wits about you and act quickly and energetically, you should have any situation well in hand. Act ruthlessly if the occasion warrants it, remembering that if you hesitate, two lives, and not one, may be lost.

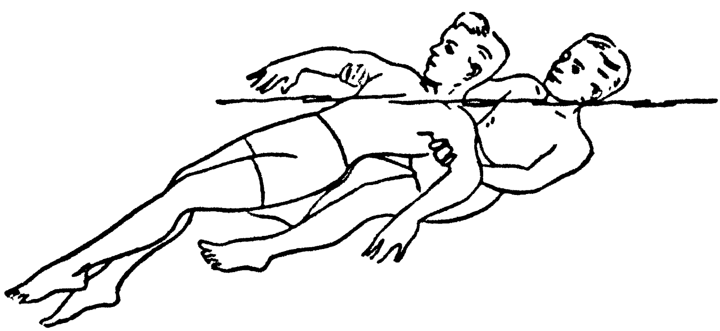
If the drowning person manages to grip you by the wrists, press

your hands together, and, raising them slightly, bring them down in the water with a jerk, swinging the arms outwards. This should force the drowning person to release his grip. Quickly grip him by



Life saving

the shoulders, turn him round, and place the palms of both hands on his ears and lean backwards, using a breast-stroke leg action to move to safety. Remember to take a firm grip of the man's head and prevent him from struggling. Keep his face above water, of course, and

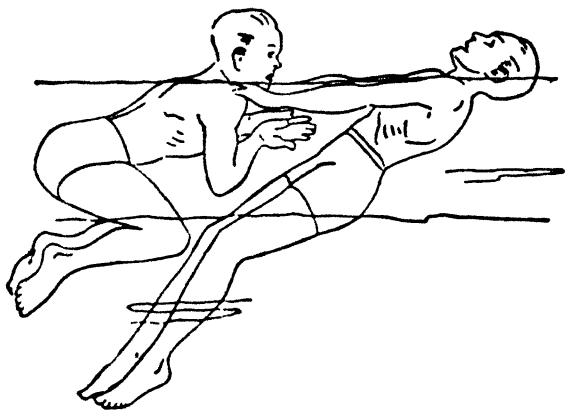


Life saving

keep his body well up on your chest. This will give you better control of him.

Should he struggle and you are unable to retain control of him, slip the hands from his head and quickly grip him at the elbows, thumbs uppermost, and continue to kick your legs as described, keeping the man well up on your chest for better control.

If gripped round the neck, the rescuer should lean against the person's chest and put his full weight on him, at the same time slipping the left hand to the small of his back, while the right hand is brought over his chin, pinching the nostrils sharply, and pushing the chin backwards. This will make him gasp for air and relax his grip, making it easier for you to turn him round by the shoulders,



Assisting the tired swimmer

and, with both hands under his armpits, fingers spread over chest, pull him to safety.

It may be necessary for you, when gripped thus by a drowning person, to assist your release by a vigorous knee-prod in the stomach, or even to administer a knock-out punch on the chin, but it is essential that you get clear of his hold, otherwise the consequences would be fatal for both.

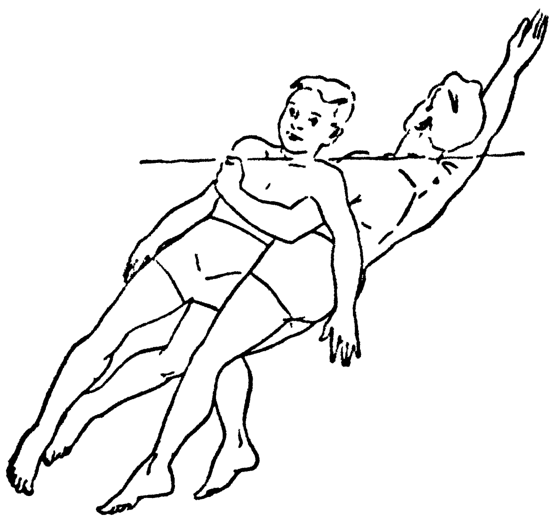
The Tired Swimmer.

You should know how to rescue a tired swimmer. In this case it is all right to approach the person from the front and tell him what you want him to do. That is, to place the tips of his fingers on your shoulders and lean well back in the water, allowing his legs to float near the surface.

If the arms are kept outstretched and not bent, the tired swimmer will be able to rest in the water, and hardly be conscious of your propelling him by use of the breast stroke to *terra firma.*

Strong side-stroke swimmers have the advantage of yet another method of rescuing a tired swimmer. Simply put one arm across the person's chest, gripping him under the armpit, and by use of a scissors movement of the legs you can keep the patient afloat and bring him to shallow water.

It is a mistake to think that those in danger of drowning always shout for help. Frequently they do, and of course assistance is usually



Life saving. Method for the strong side stroke swimmer

forthcoming, but I have had personal experience of swimmers who, after swimming considerable distances, have become so exhausted that they started sinking to the bottom without uttering a single cry. Luckily for them their plight was seen and they were soon rescued; but let this be a warning to you always to be on the look-out for swimmers in difficulty.

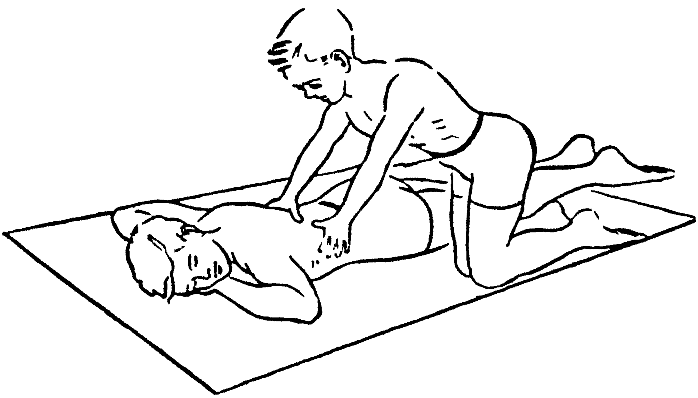
Here are a few words about artificial respiration which will be helpful to you. No time should be lost once the person is brought to land. If he is unconscious, place him face downwards on the ground, with his face turned to one side, so that you can watch for the return of breathing. Hands are placed at the side of the head.

Kneel on one side of the patient and, thumbs together, hands

in the small of the back, immediately start to apply pressure, taking care not to bend the arms.

Kneel forward on your knees and steadily allow the weight of your body to produce a firm downward pressure, coming back slowly without allowing the hands to leave the body. This forward and backward movement is repeated every four or five seconds, swaying your body forward and backward twelve to fifteen times a minute.

Pressure is released, of course, on the backward movement, and air allowed to enter the body. Pressure forces it out again, and thus there is built up an exchange of air similar to natural respiration.



Artificial respiration

This must be continued until the patient shows signs of breathing or until a doctor says it is of no avail. A team of assistants can be employed in the artificial respiration as long as there is no break in the continuity of pressure.

Once breathing is restored, warmth has to be promoted by rubbing towards the heart, and the circulation encouraged by application of some form of heat, such as hot-water bottles or hot flannels, taking care not to burn the patient.

Only after breathing has been restored should tea or a hot drink be given. Keep any crowd well clear of the patient, who should be removed to a house and warmth as soon as possible. A doctor should always be sent for immediately an accident occurs, but pending his arrival, you can be attempting to restore the person's life.

Racing.

Most of you will have the ambition to win races, but even if you do not you can derive some excitement from the healthy rivalry engendered by competition with young people of your own age. And not a little fun too.

Try to plan your own training programme for a particular event —you will find it is the little extra effort that will bring you the success you wanted. Make up your mind to do so much each day, and you will be pleasantly surprised how much better you will feel towards the day of the race.

If your race is 100 yards free style, and you have three weeks in which to train for it, try to spend half an hour each day in the water, setting yourself a definite programme, and if possible train with someone of your own age—it is much more interesting than swimming on your own.

What time you are able to swim each day is, of course, a matter of circumstances for most of you, but see that it is not too soon after a heavy meal. Few of you should worry about diet, but obviously you will watch not to eat anything that is likely to upset your stomach.

I should spend the first week swimming middle distances up to 300 yards. This will give you the necessary stamina for the sprinting to follow. Pay attention to breathing; monotony can easily be avoided by, for example, counting the number of strokes per length or the number of breaths one takes.

Vary the pace, with short bursts of speed, and watch your turning. During the second week the distance you swim daily can be reduced to half, and the training varied by quickeners like one-breadth or two-breadth sprints, &c. Gradually you will find yourself getting tuned up nicely.

For the last week I recommend at least two 100-yard sprints with an opponent capable of giving you a close race, the practice of racing starts, quicker turns, &c.

Repeated swimming against the watch is not advisable, but occasional timing is, of course, essential for a gauge as to progress. But even if the watch is disappointing, do not be downhearted—very often a swimmer fails to give of his best in practice and only competition reveals his real form.

Importance of Rest.

If the race is in the evening rest as much as possible in the afternoon, and go to the bath feeling really like swimming. Do not make the mistake of standing about too much before the event, and, above all, keep warm if you have stripped in readiness.

A little excitement is only natural, so do not worry if your mouth starts to feel dry. Suck a sweet, keep your wits about you, and be ready to seize any advantage that may come your way during the race.

Special attention to leg kicking during training may be the means of winning the race for you, for in sprints it is often the last ten yards that count, and the extra thrash of your leg kick may steal the event for you.

Isolation of leg and arm work in training is strongly advised. Distance swimming, while monotonous, undoubtedly helps to mould the stroke. Try to get the company of other swimmers of similar ability, and training will not be nearly so humdrum.

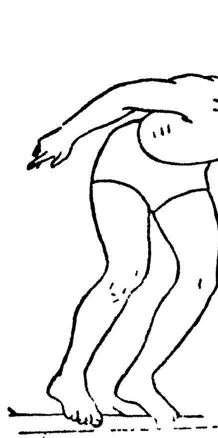
Training for swimming is not very different from training for any other sport. It is largely a matter of common sense—good sleep, wholesome food at regular times, and keeping the bowels well regulated. Walking in the open air is good exercise, but football or other similar games have to be frowned upon. Simple stretching exercises, and certain well-chosen games like golf do no harm if played in moderation.

If you are swimming in a pool that is strange to you, arrange, if possible, to have a try-out there before the race. Familiarity with one's surroundings plays quite an important part in successful racing. Only practice will cure the inexperienced swimmer of the habit of tensing his muscles when racing.

The racing start is worth perfecting, for a good start is half the battle in everything. When the starter calls " on your mark ", you will be standing about a yard from the edge of the pool. Immediately step forward, feet close together, but not touching, until the toes curl round the edge of the banking. By the time you take a crouching position and a deep breath, the starter will have shouted " Go!" or fired his pistol.

Swinging your arms and pushing hard against the side of the bath with your toes, spring forward as far as you can, and allow the body to pass through the air, arms in line with the head. Almost

immediately the arms cut the surface of the water you should be in rhythm with your crawl stroke, legs and arms sending you off to a good start.



Ready for the pistol

Diving.

Diving is certainly one aspect of swimming that will exercise a great appeal to you. It is undoubtedly the most spectacular side of the sport, and is always a popular attraction at galas.

The fascination that beginners find in learning to dive seems to continue even among the more proficient performers, and the experts themselves are tremendously enthusiastic about their art.

Yet diving is peculiar in the sense that you either take to it or you do not. There are numerous cases on record of non-swimmers being able to dive, while those who can swim a little have been known to take much persuasion before they venture to dive at all.

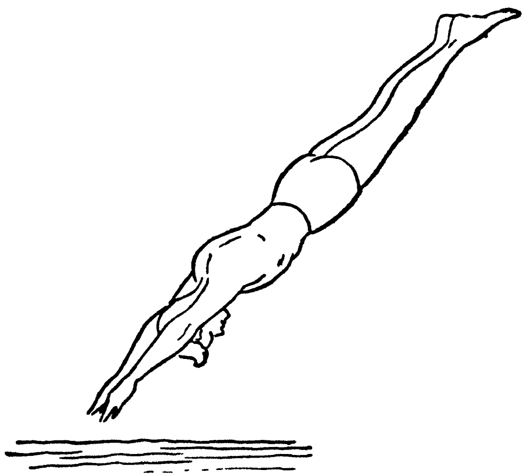
Learning to dive is not difficult once you make up your mind that you are going to do so. A quiet perseverance and confidence in yourself will see you through.

The easiest way to start is by sitting on the side of the pool and " plop " in, head well tucked between your outstretched arms, the thumbs touching. If you cannot swim, see that there is someone standing in the shallow end ready to hasten your rise to the surface, though in all probability your dive will be a " plop " in all senses

of the word. Take a deep breath before you leave the side of the pool, and blow out through your mouth when you enter the water.

A few attempts like this will give you every confidence to stand up and do the dive properly, and practice alone, under some supervision, will reveal a great improvement in a very short time.

Common sense should tell you if the water is deep enough, for of course the height of your dive is always determined by the depth of water underneath.



Correct diving attitude

The amazing variety of dives is perhaps one of the biggest attractions of diving to swimmers. Learning and perfecting a certain type of dive will give great satisfaction and enjoyment.

Here is the correct stance for the ordinary plain dive. Stand erect on the side of the pool, feet touching, arms close to side of body, palms turned inwards. The take-off is done with a slight bending of the knees, at the same time raising the arms quickly, thumbs touching, to the side of the head, head being well tucked in between outstretched arms immediately you are in flight.

The hands cut the water first and the whole body follows in perfect line, with the minimum of splash. Points to remember are, the arms fully outstretched and firm, and similarly the legs, with the knees and toes touching. Depth of entry varies, of course,

with the height of the dive, but to rise to the surface the swimmer has merely to turn his hands in an upward direction for the body to rise slowly to the top.

Sea Bathing.

Here are some common-sense precautions when you go bathing in the sea.

Always seek local advice and ascertain if the area you propose to swim in is generally considered safe. If it is not, play safe yourself and go where you are told that bathing is reasonably considered to be all right.

Even if you are a strong swimmer do not venture out far beyond your depth, unless you are in the company of equally good swimmers, or there is a boat within easy reach. You can get all the fun and enjoyment you want in sea bathing by keeping within easy reach of the shore.

If you are seized with cramp do not panic, but try to attract the attention of another swimmer, and, pending his arrival, lie back on the surface of the water and rest as much as possible. The natural buoyancy of salt water should help to keep you up until assistance is at hand. If you have cramp in the leg try bending your big toe backwards and forwards—it sometimes helps to ease the tension of the muscles. Avoid all jerkiness of leg kicking from then on, otherwise another attack may develop. If you adopt the " tired swimmer " method of rescue, already described, you should be brought to land without difficulty.

Crawl swimming will get you nowhere in rough seas, rather swim breast stroke and avoid being buffeted about by the waves. Or use the trudgeon stroke, where the legs do a breast-stroke action, or something similar to that, and the arms are used like the crawl. The important thing is that the head can be clear of the surface of the water, and you can watch what is happening.

Do not remain in the water once you start to feel cold and shivery—you will only develop a cold and spoil the rest of your holiday. Rather enjoy the swim, get out when common sense tells you that you have had enough, and have a brisk rub down. There is nothing to beat the glowing after-effects of a sea-water swim, not to mention the appetite it produces!

WRESTLING

Dictionaries say that wrestling is to contend by grappling, or the exercise of two persons struggling to throw each other upon the ground.

Wrestling became a sport through being governed by rules for some two thousand years or more, these laws and methods varying in different parts of the world. It was brought to a fine art among the ancient Greeks, who popularized it by competitions, held at the Olympic, Isthmian and other games-meetings. The style they used is now called the " Upright " or Graeco-Roman, in which the combatants stand face to face and the victor is he who throws his opponent three times. The Grecian athlete, Milo of Croton, won the wrestling prize six times at these games: Shakespeare mentions him, saying that he could kill an ox with one blow.

Wrestling is mainly a trial of strength, a splendid exercise which brings every muscle into play and in which so much skill and quickness are also needed as to make it a fine sport for boys and men alike.

It is a useful sport, too, giving self-confidence both in attack and defence. For this reason, it is included in a policeman's training, together with boxing and the more tricky and subtle " Judo " methods of dealing with criminals and tough characters. A thorough knowledge of the various " grips ", " holds " and " falls " will often prove most valuable in an emergency or tight place.

Organized wrestling contests took place in England from Plantagenet days onward, and challenges were sent from one town or village to another. But it was more or less a country sport and flourished especially in the West Country and among the dalesmen of the North.

Three methods of wrestling still exist in Great Britain: (1) the Cornwall and Devon style; (2) the Cumberland and Westmorland system; and (3) " Catch-as-catch-can ", or the Lancashire method. This last is perhaps the most popular nowadays, and, with modifications, it is really the one adopted by Indian, Japanese and other Eastern wrestlers.

To give a "Cornish hug" is proverbial in the West Country, and from early days Cornwall and Devon have produced some of the best English wrestlers. The sport has always been taken very seriously "down westalong", and complicated rules make it hard to adjudicate.

The contests take place in a ring thirty yards in diameter, and each competitor has a second or "sidesman".

The combatants stand facing each other, stooping, swerving, feinting and dodging; they spend much time in preliminary manœuvres aimed at securing a good hold above the waist.

Once at grips, they struggle for a "fall", this consisting in both hips and one shoulder, or two shoulders and one hip, touching the ground simultaneously—no easy thing to accomplish. A wily wrestler, indeed, even when brought to the ground, can avert defeat for a long while by turning over on to his face. In some of R. D. Blackmore's books, such as *Clara Vaughan*, there are grand descriptions of West Country wrestling.

In the Cumberland and Westmorland fashion, the combatants take their stance chest to chest, each setting his chin on his rival's shoulder, with head up, and grasping him round the body low down on the back (fig. 1). This he does by placing his left arm above the right arm of the other man and his right arm under the left elbow of his opponent.

When both have taken their grips or "holds", the fight begins.

The aim is to unloose the grip or clasp of the antagonist; when this occurs, the bout is won, since breaking hold counts the same as a fall.

A competitor is also beaten if forced to touch the ground with his knee or any higher part of his body. This is called "grassing".

The wrestlers may use any means to throw each other, or to break their opponent's hold, except kicking.

In this connexion, it is perfectly fair to knock one's adversary's leg with one's own in order to make him lose his balance.

If both wrestlers fall together, side by side, and the umpire cannot be certain which was "grassed" first, it is called a "Dog fall", and the bout must be wrestled over again. But if one definitely touches ground first, or is under his antagonist, he is the loser.

The preliminary "hold" is all-important in this kind of wrest-

ling. Grip with clenched or locked fingers, one hand in the other placed back to front.

Afterwards, many kinds of " Chips " or falls are attempted.

One called the " Outside Strike " is effected by lifting one's opponent and twisting him round in either direction, then striking his leg from under him with one's own, so stopping his momentum.



Fig. 1.—The hold

In the " Hipe " (fig. 2), the adversary is twisted to the left and one's own shoulder forced under his left arm as far as possible, to secure leverage. He is then lifted off his feet and his left leg caught inside by one's own right leg and dragged up, thus throwing him down.

These were the favourite " Chips " of a great Cumberland champion of a century ago, William Wilson, who stood 6 ft. 4 in. and weighed 15 stone. We are told, " he gained (i.e. defeated) most of his opponents with these ".

The " Hank " and the " Click " are two other important falls. To accomplish the first, one competitor simply turns sideways,

twists his leg round his rival and tries to pull him backwards by main strength. The way to counter the "Hank" is to bend forward and strengthen one's own hold.

The "Click" is effected by pulling an opponent forward in order to make him drag back, and, when he does this, "click" his left leg with one's right leg. If he is pulling away at the same moment, he is bound to fail.

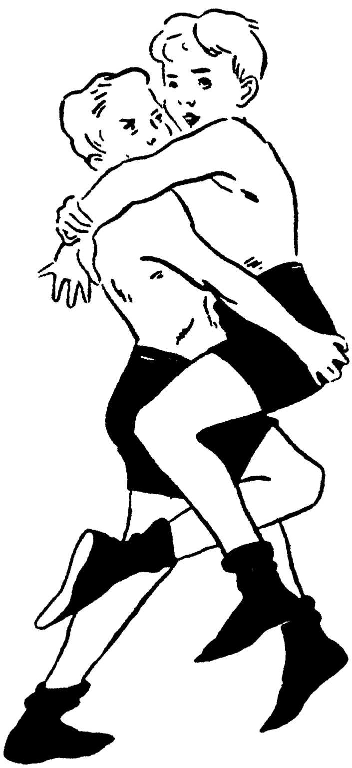


Fig. 2.—The hips

Some people think that wrestling after the Cumberland and Westmorland fashion came from Scandinavia and point out that the Lake Country pronunciation "wrussle" is much like the old Norse word "wrusla".

The ancient Vikings and Norsemen were indeed great wrestlers: the old "Grettir Saga" contains what we should now call a vivid "running commentary" on a bout, Grettir *versus* the Rest, a two-to-one contest in which the hero, Grettir, who had the strength of four other men, "grassed" his opponents, the twin brothers Thord and Erik.

The north country "Dalesmen", from whom most of the wrestlers come, tall, fair, strongly built and of fine physique, are often supposed to be descended from the Norsemen, but wrestling has always been such a universal sport, from time immemorial, that one can scarcely find its origin in any one country or race.

The Lancashire system of wrestling allows more variety than any other, as its popular name, "Catch-as-catch-can", denotes. It concedes all the "holds" permitted by other types and many others of its own, and may be called both rough-and-tumble and rough-and-ready.

The competitors take hold as they please and indulge in un-

limited manœuvres, including all leg-holds and struggling on the ground. Anything is allowable, except kicking and limb-breaking tactics. Even throttling, though actually forbidden, is sometimes used in the heat of the fight.

Two shoulders down on the mat constitutes a win.

There are many forms of holds and throws. The players approach each other in a stopping attitude before grappling, watching for an opening and seizing the opportunity with swiftness and agility.

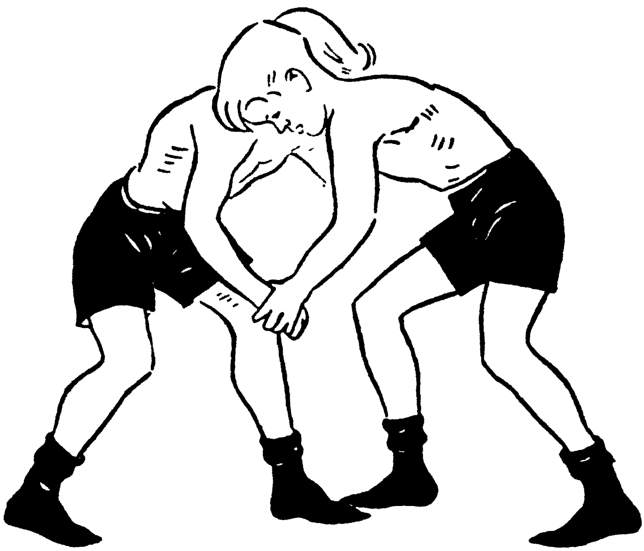


Fig 3.—Catch-as-catch-can. First grip

A wrist or head hold usually begins the fight.

In the first instance, one combatant seizes the other by his opposite wrist (fig. 3) and simultaneously steps forward, stoops and catches him round the thigh, trying by a sharp jerk to throw him across his shoulder and so backwards to the ground.

The famous " Chip " called the " Half Nelson " (fig. 4) is carried out by one competitor thrusting his arm as far as possible under the upper arm of his adversary, while his hand is placed on the back of the other's head.

This strategy is often used when fighting on the ground, in order to turn one's opponent upon his back.

In the " Double Nelson " the same movements occur, but both arms are used. This is very dangerous and, like the " Crutch hold " (also used when struggling on the ground), is barred in Lancashire style wrestling.



Fig. 4.—The half nelson

Other Catch-as-catch-can holds are the " Thigh hold ", " Double thigh hold " and " Back heel ".

This last " Trip " is brought about by putting a foot behind the opponent's heel and trying to bend over it, while preserving a firm stance and pushing with the chest.

If a back heel is put on one, the response is to suddenly slacken hold, without letting go, and try to turn one's side, so as to get as

far as possible under one's adversary and secure a " Buttock " fall by throwing him over one's shoulder.

A " Cross buttock " is accomplished when one opponent has succeeded in getting behind the other. If the latter can cross both his adversary's legs with one of his own, extended at just the right moment, a fall is almost certain.

In early days, when, as an old writer on the subject says, " All was done in love and honour ", the rewards for wrestling were no more than a leather, brass-buckled belt in the North and a leather purse in the West Country, sometimes accompanied by a small sum of money.

But the diarist Evelyn tells of a wrestling contest which took place in St. James's Park in February, 1669, when the fighters of the North and West contended—the West Country men becoming the champions—for the then immense prize of £1000.

The dress for wrestling has varied at different times and in different places. Greek combatants covered their naked bodies with oil, to make holds difficult. So do Eastern wrestlers of the present day.

West Country fighters used to wear strong linen coats and stockings; Lancashire wrestlers are naked except for drawers and the regulation stockinged feet.

But for most wrestling purposes a vest and shorts or drawers, with stockings or thick socks, or canvas rubber-soled shoes with no nails or studs, will serve, and no other outfit is required for beginners. In fact, the minimum of clothing should be worn.

The surface on which wrestling bouts take place naturally varies according to circumstances. Usually nowadays it is a mat, about 16 feet square and very thick and firm. Sandy arenas are the scene of Eastern wrestling. In Cumberland and Westmorland contests have usually been held on bowling-greens or other turfed spaces—hence the term " grassed " for being thrown, in North Country sports.

On one occasion during the great frost of 1785 in the Lake District, wrestling bouts took place on the ice, the competitors wearing clogs and leather close-fitting jerkins.

A noted wrestler of modern times in the " Catch-as-catch-can " and all-in styles is Michael Gill, who, in 1936, started to wrestle his way round the world. The only fighter he never beat was Douglas Clarke, the world's champion wrestler, who discovered the

powers of the young Yorkshire Rugger player and introduced him to Lord Londsdale, a great patron of wrestling, at the famous Grasmere Games.

Gill stands 6 ft. and weighs nearly 17 stone—a very big man, like most of the great wrestlers, for this is a sport where weight counts. Rowan Long, a great nineteenth-century Lake District champion, who was also a woodcutter, weighed 18 stone and stood 6 ft. 2 in.; he is said to have been able to draw a heavy cart loaded with wood, pulling between the shafts like a horse.

Gill's wrestling tour took him first to Australia, where much interest was shown in the sport. Then he went to India and gave wrestling bouts there in aid of the Red Cross. This brought him in contact with the "wrestling strings" kept up by several Maharajahs, among whom he was entertained as a "guest star". For these Indian princes still maintain court wrestlers, ready to meet all-comers, just as was the position in England from Plantagenet days onward. Shakespeare in *As You Like It* speaks of Charles, the wrestler, who is "grassed" by Orlando, as the "bony prizer of the Humorous Duke"; and on the other side of the world, in Japan, it is recorded that in 23 B.C. the Emperor matched two enormously strong men, Kehayer and Nomi-no-Sekune, in a wrestling contest. Kehayer was killed, and his antagonist became the patron deity of all Japanese wrestlers.

However, we should not think of wrestling as a "sport of kings", but rather one in which all healthy men and boys can find enjoyment as well as profit.

BILLIARDS AND SNOOKER

So many thousands of people to-day possess a quarter-size (6 ft. by 3 ft.) billiards table that the game may well claim to be England's most popular indoor winter amusement; nor is the small table to be despised merely because it is not standard size. The angles and strokes are the same, the main difference being that with a standard table the balls are larger, heavier, and they seem to have such a tremendous distance to travel before they reach the top pockets! Players accustomed to full-size tables, however, have just as much difficulty to adapt themselves at first to the miniature game, so there is a handicap on both sides.

These brief notes are intended to help beginners to improve their game, by pointing out a few of the more obvious traps and faults.

We are constantly told by the experts, and usually with some justice, that the amateur's commonest fault is bad cueing; but there are others. No player can make the balls do just what he wishes for very long; most amateurs, in fact, frequently fail to make them do what they want at all! An amateur break of 100 is a thing to be treasured in the memory for a very long time. From this it follows that the art of so playing your strokes as to be able to score off the following stroke is almost as important as good cuemanship. Finally, many people are too prone to experiment with "side" when they should play a plain ball, and the novice will even put side on in the wrong direction. Let us now take these three matters in turn.

Any tendency to jab the cue downwards towards the table is a grave error. Your cue should strike the ball with an easy, flowing motion, and as straight forward as possible; therefore, not only must you stand in the right position to make this practicable, but the cue must be held down almost parallel to the cloth. Do not "stab" the ball, for that gives it unintended impetus and perhaps also "side". Keep the tip of your cue well chalked, or a miscue will result. In cue play, much depends on the sort of bridge one makes; exactly how it is done, however, is of less importance than having the thumb and index finger immovable, and the hand steady

on the table, so that the cue glides along effortlessly as in a groove. Practise this again and again, and also the splayed-finger and crooked-forefinger actions which are sometimes needed for difficult positions —one can never be too cue-perfect. Where the cue is held is also a matter for individual taste. Some first-class players hold it right at the butt, others at various short distances from the end; but they all see that the grip, though firm, is easy enough to give full play to the wrist.

When making a stroke, after first fixing the positions of the balls in your mind, keep your eyes focussed on the object ball, concentrating upon the point at which you intend to hit it; and when making your stroke keep both head and body still. Until you thoroughly understand the nature and consequences of "side", always hit the cue ball in the centre, just above the middle. It often happens that the other player is an irritating fellow, who makes his strokes much more rapidly than you do; but do not allow such tactics to tempt you out of your natural pace, or you will certainly begin to make bad strokes. On the other hand, too much deliberation is annoying to everyone.

A good test of cue control is to place the cue ball on the centre spot of the D and hit it so that it travels straight up the table over the other spots and back upon its own course; after a few attempts, you will find that you are hitting the ball truly. Now place it on one outer spot of the D and send it to the top of the table, so that the rebound brings it back to the other outer spot (fig. 1); to achieve this, fix the gaze on the middle of the cushion directly behind the spot; your stroke will automatically travel in that direction. It is good practice, by the way, to test the cushions by placing one ball in any position fairly near to a cushion and then trying to cannon off the cushion, placing the cue ball first near and then more remote; in this way one learns a lot about the different angles one can make. (These angles vary with different tables and even with the same table on dry and humid days.)

During the most critical part of many a fierce struggle, and especially in small rooms, a player may find himself compelled to use the rest; I am afraid that a good many do so with an inward dread of what may follow, a sure sign that the rest has not been used very much before. The solution is the same as for many other difficulties of billiards—practice. One should practise a few shots with the rest daily; the stroke is then made with confidence, and it

may mean all the difference between victory and defeat. Be sure that you are comfortable and well balanced before making the stroke, and then hit boldly and true.

Coming to the game proper, as you know, if you pocket your own ball off the red you score three points, or if off your opponent's ball two points, and in either event your ball is returned to the D; these are losing hazards. If you put down the red ball—a winning hazard—you score three points; the red is returned to spot. If the red cannot be replaced because of obstruction by another ball, place it on the snooker spot, and if that too is obstructed, place it on the middle spot of the table. Should you pocket your opponent's ball—as you are quite entitled to do whenever it suits your game—it remains out of play until your break is finished, but you score two points. The great objection to doing this, of course, is not any imaginary unfairness, but because it leaves one with only the red to play at. If the cue ball strikes the other two balls in turn, two points are scored for a cannon. If, after a cannon, you pocket the white (or your own ball), you score four points; if you cannon and then pocket the red, five points; if you cannon and then pocket both red and a white, seven points; if you cannon and then pocket both white balls, six points; if you cannon off the red, then pocket both white balls, or the red and the opponent's ball, you score seven. There are higher scores, of course, ten being the maximum possible; but players have been known to refuse to continue after so grave a fluke as a ten!

To break the balls and start the game, the red is placed on spot, the player's ball anywhere within the D. He aims at the red and if he misses it (or if he ever fails to hit a ball) he forfeits one point; if, in addition to missing the object ball, he has the misfortune to send his own into a pocket, he forfeits two points. Should his ball jump off the table after hitting an object ball he also forfeits two points, and does not score. In billiards, as in so many other games, as a rule one cannot score from a foul stroke; but there is one exception. If one has struck the wrong ball and scored, any points scored before the mistake was noticed are allowed to the delinquent. Should a player accidentally move a ball it counts as a stroke and the opponent is entitled to take over. To hit the balls while in motion, or to hit one's own ball more than once in a stroke, is also a foul. After a foul, the opponent may either spot the red and play from baulk, or continue with the balls as they lie, which-

ever he thinks best; or he may, if he chooses, overlook the foul altogether.

If, when it is your turn to play, your ball is touching another, the balls must be broken, i.e. red goes to spot, opponent's ball to middle spot, and your own ball into baulk.

The normal game between amateurs is 100 up; on a small table

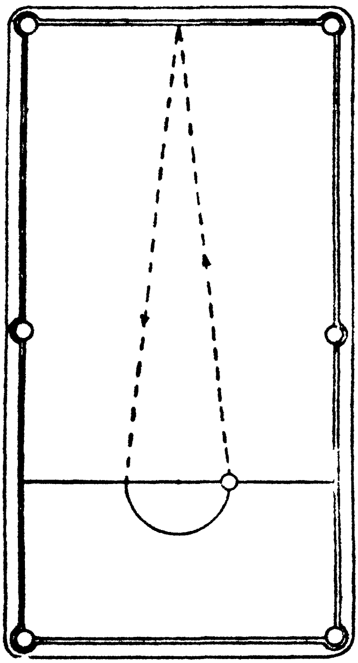


Fig. 1

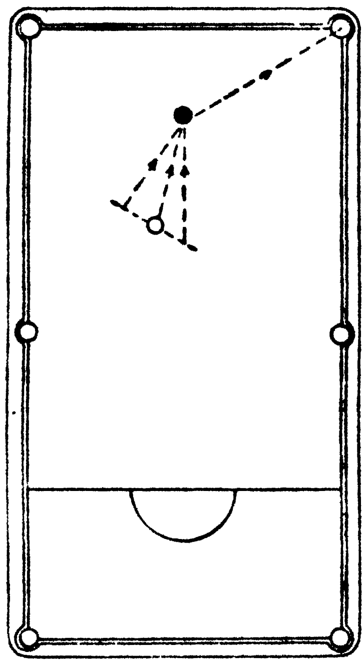


Fig. 2

it should take twenty to twenty-five minutes; a champion, of course, might achieve this in a single break, but that is not ordinary billiards!

In order to make any sort of break, one must keep the balls reasonably well together. The first player cannot do this. By applying side, he may go in off the red; or he may hit the red fairly hard and so bring both balls back into baulk. His opponent now has to play a "double baulk". This can be done in two ways, either by playing up the table, striking the top cushion at such a point that

the cue ball will come back to strike one or both of the balls in baulk; or he may place his ball near the outside of the D and play across the table to a point just outside the D; by applying side, the ball will come back within the D, strike another ball, and so save him a possible miss. (See fig. 10.)

When playing to go in-off, the strength of the shot is all-important. In fig. 2, for example, it is quite simple to go in off the red from any point on the dotted line; but only so much strength should be used that the red will return to the middle of the table just below the middle pockets. By doing this, the cue ball when played next time from baulk enters a middle pocket after striking the red, and if the strength be correct the red will again come back close to its former position and thus enable another three to be chalked up. Many years ago a famous professional exploited this stroke so much that afterwards only twenty-five consecutive losing hazards were ruled to be permissible, so as to stop the monotony; and from time to time other simple but effective break-making strokes have been barred in the best interests of the game.

When contemplating a cannon, consider always what will happen to the balls that have been struck, as well as the fate of your own. Set up simple cannon positions and practise upon them again and again, until you see just what strength produces a desired result. Avoid round-the-table cannons or long shots at difficult angles, unless there is nothing else to do. In general, and for cannons that are not at very obtuse angles, the cue ball should be hit in the middle, rather above the centre; but for very fine angles side is essential. Remember that one can often get out of a difficulty by making a cannon off the cushion. Kiss-cannons are a common trap for the unwary; unless one is sure of the pace of the table and the strength of one's stroke, the cue ball may bounce off the object ball with a disconcerting sharpness. When unable to score yourself, it is wise to ensure that your opponent does not score either; always leave him as little as possible. It is no use collecting a dozen points or so, if at the end you leave your opponent in a position to score twenty or thirty! Besides, safety play has a curiously unnerving effect on many players, especially young ones.

Cannons are practically the same as in-off shots, with the second ball in the position of the pocket; but of course there is a wider margin of error permissible with a cannon. In potting a ball, on the other hand, there is almost no margin at all; you either hit it

straight into the pocket, or it wobbles in the mouth and comes out again. Side will get a cue ball into many an awkward pocket, but cannot possibly help you with a potted ball, if the balls are at all true. You should therefore practise single pots in all sorts of positions, first with the aim of potting the ball, and secondly (not less important) of seeing where the cue ball ends up in relation to the next shot to be made. By doing this daily for a few weeks you will learn more about your table than by reading any number of hints.

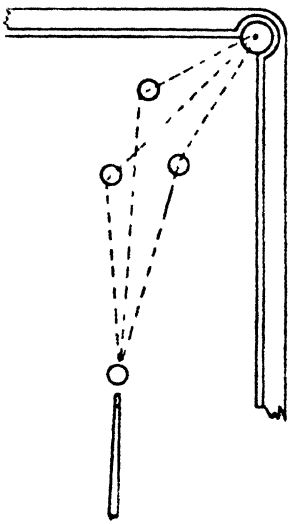


Fig. 3

The essential point about potting is the spot at which the object ball is struck. The correct position is on a line from the centre of the pocket to the centre of the ball (fig. 3); there is no chance about it, and if you cannot hit that point you are most unlikely to make the pot. Of course, a pot at long range shows good cue control; the farther apart the balls, the greater must be the accuracy. If you desire to follow through, so that your cue ball follows the object ball into the pocket, hit it rather higher above the middle; this increases its rolling motion sufficiently to overcome the inertia that ensues upon the two balls making contact. If, on the other hand, you are playing snooker, and have to pot a ball that is almost within the pocket, your own ball will stop dead on contact if you hit it low enough (but not low enough to make it jump).

Nursery cannons are worth practising too, but they require much delicacy of touch or the balls will scatter. There are many possible lines of play, but the chief aim should be for the cue ball to pass beyond both struck balls at each stroke, but only an inch or so, these balls being merely brushed in passing.

We have spoken of " side ". Side is imparting to the cue ball a spin, in addition to a forward motion, by striking it on either side of the centre. It should be practised long and thoroughly before you venture much upon it in an actual game. Consider fig. 4. If the cue ball is struck truly, i.e. in the middle, it will travel along

the angle COB. If it be struck (with the same strength, of course) on the right-hand side, it will spin anti-clockwise on its route to O, and will come off at the angle COA. If, however, it be struck on the left-hand side, it will spin clockwise on its course to A, and will make the angle COC. For a fine angle, then, the last course would be preferable, but for a very sharp angle, the " side " must be imparted to the opposite side of the ball. The greater side you give your ball the greater the effect. Practise this in all sorts of positions, and try to see the reason for the resulting behaviour of

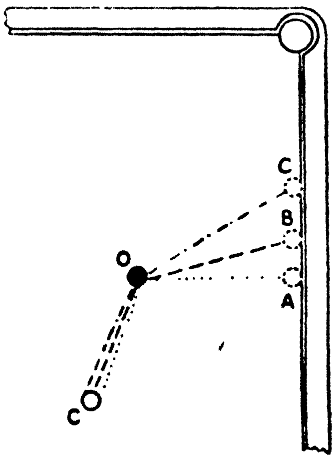
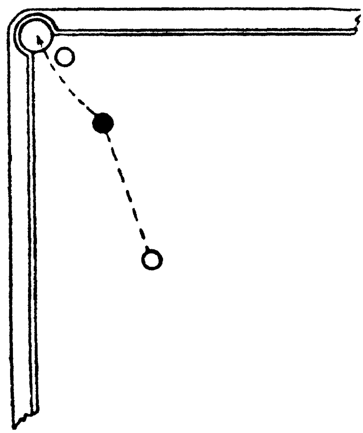


Fig. 4


Fig. 5

the balls. One result of side is that one can make a ball curve past an obstacle into a pocket, as in fig. 5. Another is, that if the cue ball has side (of course, on the correct side), it will turn into a pocket after hitting the lip, whereas a true ball would rebound out again. Do not put side on any ball that is to make an ordinary cannon, or you may miss it completely. You cannot impart side to the ball which is struck.

Another useful shot which should be practised, but not exploited until you are thoroughly master of it, is the screw shot. It is achieved by hitting the cue ball very low down, with an almost horizontal cue; it is not necessary to strike hard, but the cue and object balls should be within a foot or so of each other. According to the strength of the screw the resulting angle will vary; a right angle is easily obtained by this means.

These brief notes must conclude with a reference to the diagrams (figs. 6 to 10). The positions shown there are all quite common and should be practised repeatedly; for in billiards more than in any other indoor game constant practice is essential even to maintain one's standard of skill.

"Snooker", as it is familiarly termed, is a delightful game,

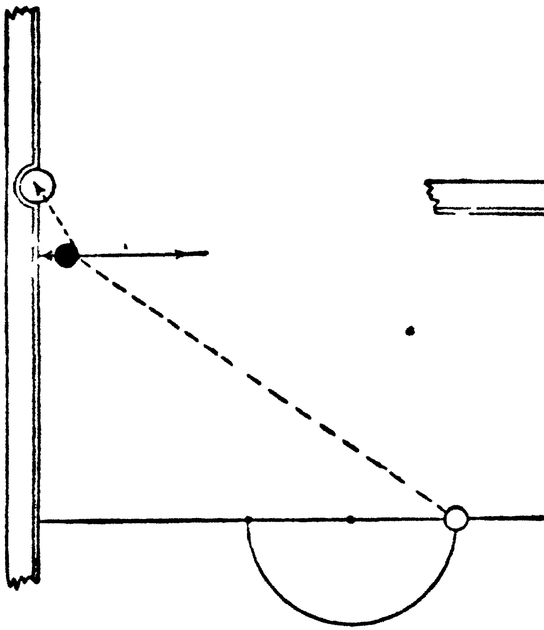


Fig. 6

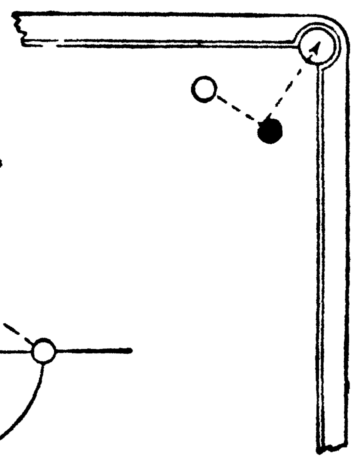


Fig. 7

which gives many people greater pleasure than billiards. It calls for far less variety of skill and ingenuity, yet its positions are infinite, and it has the advantage of being soon over. No one can shine at snooker unless he is certain of potting the balls; consequently, potting from wherever balls happen to roll on the table, and also striking so as to hit balls that are wholly or partially hidden by other balls, are the first foundations of the young player's game. He can learn later so to choose his shots that (*a*) he can follow them up by other shots, and (*b*) he can foresee the positions that will arise on any pocketed coloured balls being replaced. Here are the principal rules.

On small tables there are usually seventeen balls, viz. ten reds, and one each black, pink, blue, brown, green, yellow and white; a standard table has fifteen reds. The reds are placed together in a pyramid, with its base nearest the top of the table, and its apex on the pyramid spot. Against the apex place the pink. The black occupies the billiard

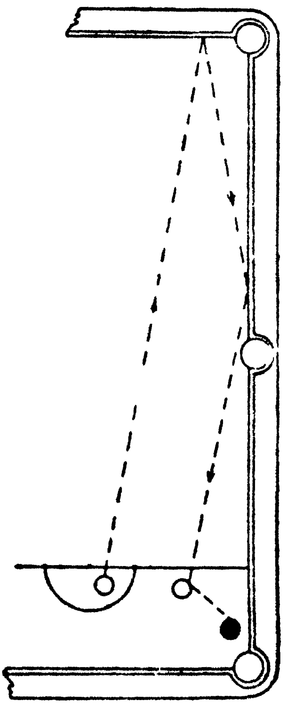


Fig. 8

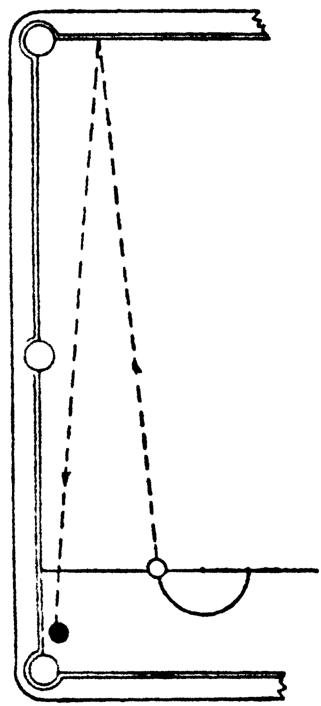


Fig. 9

spot, the blue takes the centre spot, and the brown the centre spot of the baulk line; green is on the left-hand spot on this line, and yellow on the right-hand spot. White is in hand as the cue ball. It may be played at first from anywhere within the D. There is no baulk in snooker.

The player aims at the pyramid, with the object of striking a red ball, but not (at first) of scattering the balls more than needful. The object is to pot, first a red ball, then a colour, then a red,

then a colour, until all the reds are pocketed. Each red pocketed counts one point, yellow two points, green three, brown four, blue five, pink six and black seven points. More than one red may be pocketed at one stroke, but the colours only one at a time. While reds are on the table, one may play any colour desired; but when all the reds have gone the player who put down the last red may play any colour he pleases; it is replaced on its proper spot, and he then tries to put down the colours in order of value, yellow first, then green, brown, blue, pink and black. If, after achieving all

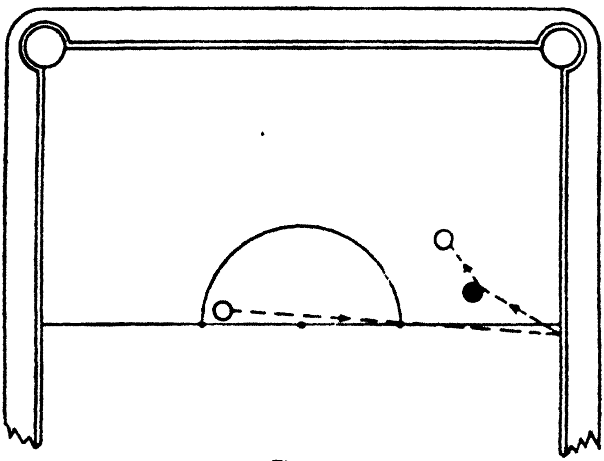


Fig. 10

this except the last, he either misses black completely or goes in off black, he loses the game, whatever his score. While reds are on the table, whenever a colour is pocketed it must be replaced on its proper spot at once; should the player omit to do this his opponent takes over, and any score made by the offender after the foul is disallowed. If the spot on which the colour should rest is occupied, it is placed on the next nearest spot; if all spots are occupied, place it as near to its own spot as possible, on the side next to the top cushion.

If a red and a colour are pocketed in the same stroke, the striker forfeits the value of the colour. If it is not apparent what ball is being aimed at, the opponent may call upon the striker to name its colour; and if the striker misses that ball but hits another (or others), he forfeits the value of the highest ball thus struck. If

he aims at a red but misses it and pockets the white instead, he forfeits one point, and his opponent continues from baulk; if the same thing happens when he aims at a colour, he forfeits the value of the colour. After every foul stroke the next player continues. You cannot score from a foul stroke. If the cue ball is touching a red or a colour, and the latter is playable, it must be played; but if the red or the colour is not playable, the striker must play away from it without disturbing it, or a foul results. Should two balls other than two reds be struck simultaneously, the player forfeits the value of the higher ball.

To be " snookered " means that a ball which must be played next is so situated in respect to the cue ball that it cannot be hit directly; and, of course, much of the tactics of snooker consists in trying to bring this situation about. To get out of a snooker, one must generally make use of the cushions, hence the value of knowing what happens to cushion shots, as suggested at the beginning of these notes. However, if a snooker arises because the snookering player made a miss, or a foul, or hit the wrong ball, then the snookered player (who continues immediately because of the foul) has the right to remove any ball which he deems necessary in order that he may hit a playable ball. The ball so removed is then replaced.

The ordinary fouls of billiards—e.g. hitting a ball twice, accidentally touching a ball, or lifting both feet off the floor, apply equally to snooker.

In both games a push stroke is a foul; the ball must be struck, not pushed.

To conclude this brief article, the care of the table demands constant but slight attention. When not in use it should be covered, but take care to keep out moths. At regular intervals brush the cloth well, but not heavily, always brushing in the one direction, up-table. Then warm an iron, taking particular pains not to make it too hot. Start at the bottom end and run the iron once only up the middle of the table, over the spots. Remove the iron, return to the bottom end, and iron another strip, slightly overlapping the first; and so on. The table is then fit for play.

When adjusting your table, make sure that it is perfectly level, by the use of a small bubble level, which you should place at various points; if the bubble is not always in the centre of the level, adjust the screws under the table until it is in the centre. There is no skill in always directing the balls into one particular pocket!

BOXING

The immortal Jem Mace, ex-heavyweight champion of the world, maintained a school of boxing during his declining years. Once in the ring he said to my father, who was one of his pupils: " I shall not move my feet. Aim at my head and hit it if you can." My father was pretty quick for a heavyweight, but despite his best endeavours the old man so swayed and swerved from side to side, back and forward, as to make it most difficult to hit him. Here is one cardinal principle of boxing which the tyro must learn: anticipate what the other fellow is going to do and foil it. It was Jem Mace, too, who was reputed to have more than once punched his bare fist, for a sovereign, clean through the wooden door of a public house. Though striking, the feat is not incredible. Jim Jefferies, another famous heavyweight, could strike a blow with a force of more than 2000 pounds' weight. Little thin-armed Jimmy Wilde, who weighed scarcely seven stone, many a time sent burly Welsh miners crashing to the floor. This is principle number two: when you hit a man, hit him with all your might. Lastly in these reminiscences of old pugilists, the great John L. Sullivan said of his conqueror Corbett, during the battle, " If he would only stand up and fight I'd murder him!" Principle number three: the ring is sixteen feet square; when necessary, make use of it.

The Noble Art is not for every boy. Some there are who are fighters born, lads to whom the joy of a scrap surpasses all other pleasures, lads who can give and take with complete equanimity, and who, under proper tuition, will go far. Others, from natural instinct or from physical weakness, shrink from the hurly-burly and avoid " trouble "; and it is indeed the soundest of sound sense, in young and old alike, to avoid quarrelling or bullying. Yet occasions arise when it is necessary to stand up for oneself; and even the shrinking, timid youth would benefit from knowing how to defend himself; would acquire more self-confidence, and might even—after a judicious but not too severe punch on the nose—develop a bloodthirsty strain very disconcerting to fond parents and possibly also to himself. We are all very primitive at bottom; that is why

boxing is so universally popular. No fellow knows what he is made of until he is really in a tight corner, so put on the gloves for a spell and learn to hold your own.

Equipment.

The equipment of a young boxer costs very little. A gym vest, shorts, canvas shoes (which should always be well rubbed in the resin before practice, so as to prevent slipping down), and a pair of well-padded gloves, are all he needs. The size and weight of glove depends of course on the size and weight of the boy; 12-oz. gloves are usual, but follow the guidance of your instructor, who is always one's best friend. If one's pocket runs to a punching ball of one's own, so much the better, but of course that involves a little extra trouble. A ball that is secured to both ceiling and floor will soon teach the novice to dodge out of danger, but for general purposes a ball hung from a ceiling board will suffice. Add a good companion who enjoys a rough-and-tumble as much as you do, and your outfit is complete. To learn anything serious about boxing, however, one must put oneself in the hands of a master, and the better the latter's status in the "profession" the better for the pupil, for the trickery and ringcraft of the old pugilist are past belief.

Position.

On facing up to an opponent, British boxers are first taught the time-honoured rule, to stand with the left leg and left arm forward, the body well balanced, slightly end-on to the opponent so as to expose as little as possible to his attack, and the right arm on guard. Taking these points in detail, the right leg must be firmly on the ground and taking most of the weight. The left leg is extended just enough to enable the boxer to spring either forward or back with ease—say about twelve inches in advance of the right; it too must feel the ground, and it should point straight at the opponent. The left arm is poised forward and downward to the crooked elbow, then straight out towards the opponent; it is very important that the fist, wrist and forearm should form one straight line. The palm of the hand should be underneath. The places most needing protection from attack are the chin and the pit of the stomach. It is well, therefore, to keep one's head well down, which brings the chin closer to the chest. Always, whatever your position, take care

to keep your eyes on those of the other man (not on his hands), never for an instant allowing your attention to be diverted by *anything* during a round. The right arm rests against the body, with the elbow over the ribs and the forearm protecting both stomach and chin, as may be necessary. Practise this elementary pose before a mirror; move about as if to strike, and then return to a defensive position, again and again, until it has become second nature to you. (One often sees a professional boxer, who has been dazed by a heavy blow, stagger in the ring, yet rarely indeed does he forget his training so much as to drop his hands completely: with him the attitude of defence has become automatic, and it should be the same with you.) The right hand is to be turned slightly outwards, partly closed, but not clenched. In general, do not clench your fists until ready to strike, but keep them loosely closed. Never hit with an open glove; and never, never tuck your thumb between the fingers and palm. The palm of the hand which is in action should as a rule be downwards; and when you hit, do so with the knuckle part of the glove only; this hurts you less and the other fellow more. The reason for keeping the hand strictly in one line with the fore-arm will be obvious if you reflect that upon striking a heavy blow the whole weight of your body, multiplied by the forward speed of the blow, is transmitted through your forearm to the fist; if, therefore, the wrist is bent at an angle, not only is most of the force wasted, but you may easily break your wrist as well. Many boxers give a slight downward twist to the hand, which has the effect of bringing it in line with the arm. Jack Dempsey, one of the worthiest world's champions we have ever seen, tells us how he often spent hours and hours doing nothing but practising "wristy" movements with the aim of strengthening himself at that point.

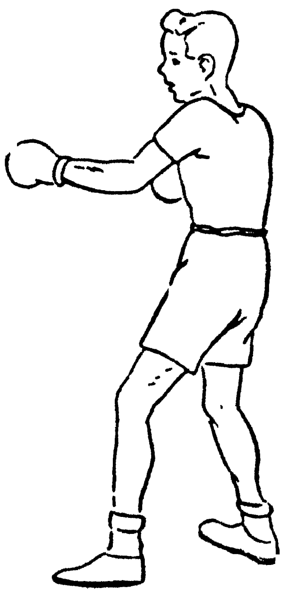


Fig. 1—Position

Footwork.

We have outlined the typical English stance (fig. 1). A difficulty sometimes arises, however, should you have to face a boxer with a right-handed stance; this unorthodox position throws one off balance and can only be dealt with by good footwork, and the necessary explanations can only be given on the ground. It was Joe Beckett's stance, among other famous boxers. Another way of standing is the American "crouch"; such an opponent is liable to spring up and forward, and to lead with either hand indifferently, but he can still be punched off with a strong left lead, delivered with the determination to stop him. Do not allow these unorthodox stances to divert you, but stand as directed herein, body well up, left side forward, leading off with the left. By the way, always seek to keep your feet in the same relative positions, whether you move forward, backward or sideways. The reason is simple. In that attitude you are truly balanced and best able to weather any heavy attack, or to deliver one of your own without upsetting your balance.

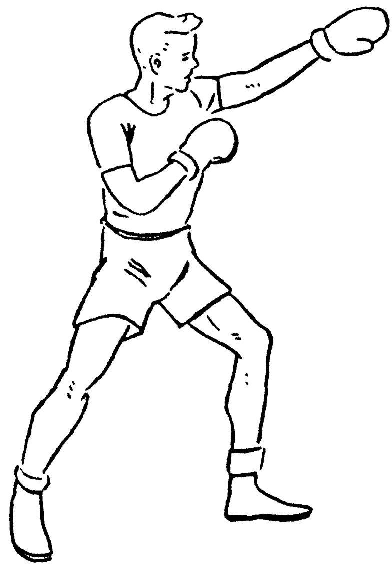


Fig. 2.—Straight l

We must consider this point still further. The handshake is over. The gong has sounded. You step swiftly into the middle of the ring, so that a speedy opponent shall not pin you at once into your own corner; and you face your man, and wonder (perhaps a little helplessly) how you are going to get at him past so much glove and forearm. He is probably thinking the same about you. So for a moment or two you circle round each other, looking for an opening; and now it is that footwork becomes so very important. To move to the right, carry the right foot in that direction, smartly but not too far, and snap back the left foot after it. Keep the feet well down near the ground. To move to the left, bring the left foot back and throw your weight to the left simultaneously, and

slide the right foot back into its new position in the rear. If you find it necessary to move the right foot first, see that the left foot is firmly on the ground—*all of it*, and vice versa. These movements must be as quick as you can manage; even a modest blow when you are unbalanced will send you toppling over in no time. When circling, or " breaking ground ", the first man to move would normally go to the left, because that course makes it more difficult for him to be hit; by moving to the right he comes straight in front of his opponent and lays himself open to a sudden punch. At last your man moves his guard a trifle and you shoot out your left arm like a flash, straight at his head (fig. 2). He blocks it. Let us now consider, on paper, this and similar actions, all of which can only be learned properly with the gloves on and in the ring.

Lead and Counter.

First of all, it is very important for novices to learn the effective distance at which they must stand, i.e. the point from which, without springing too far forward, they can reckon on getting a left lead home. This judgment of distance is acquired solely by practice, and even first-class boxers lose it after a long spell of inactivity. It means inevitably that with two men of equal skill the advantage lies with the one possessing the longer reach—not necessarily the longer arm, but the total outstretched span. If handicapped in such a way, your only course is to go in until your own reach is effective, and chance taking punishment when doing so.

The " standard " guard against a left lead to the head is to raise the right forearm, keeping the elbow well down, and to take the blow on the glove or fleshy part of the arm. There are several other defences, and it is, as a rule, advisable not merely to guard, but to counter simultaneously; for in the act of hitting out your opponent has committed himself for a fraction of time to an irrevocable course and has thus given you a chance to get at him. " Counter " should read " counter-attack ". Tie a label round your waist with the word " attack, attack attack " written all round it, if you want to become a successful boxer.

To apply this in practice, the man attacked steps forward with his left foot at the same instant as he raises his right arm to ward off the blow, while he himself strikes out at the assailant's chin with his left. Or he may get inside the lead, by stepping forward, knocking up his opponent's left arm with his right, and hitting at

the opponent's body with his left (fig. 3). Or again, he may duck his head smartly to the right so as to allow his opponent's left hand to pass harmlessly over his shoulder, and may take advantage of the impetus to get in either a body blow or an upper-cut to the jaw. On the other hand, if the man who is attacking can anticipate these moves, he will stop the counter-blows with his right glove. All these actions must be very quick. The normal left lead is an in-

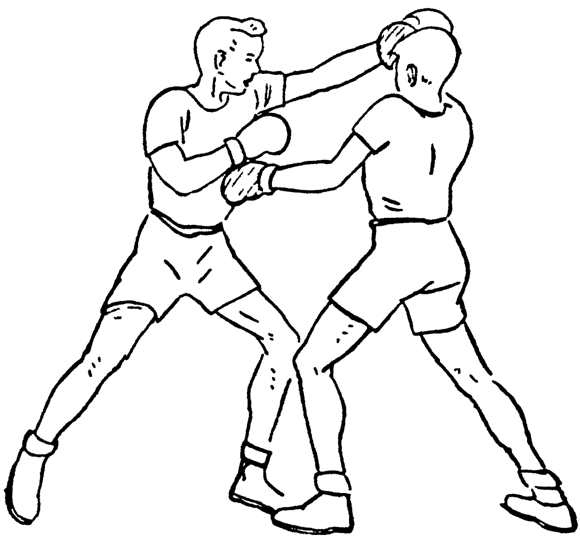


Fig. 3.—Stopping a left lead and countering to body

and-out movement: step forward, shoot out the left, step back out of danger instantly: hence if the counter is not timed properly it will fail. A speedy boxer can deliver several stinging left-hand blows in a second; it all depends on the balance and footwork. I well remember how Jack Johnson, though a heavyweight, got home three telling lefts to Jefferies' head in their famous championship fight, all within a second, and before the slower Jefferies could reply.

If, as very commonly happens, such rapier thrusts sting the other fellow into a fierce rally, there is usually no time to get out of danger by retreating; but you can sidestep his rush by a sharp movement to one side, thus forcing him to follow you round the

ring. Remember, too, that until you are really on top in a bout (and sometimes even then), you have 16 by 16 feet, or 256 square feet, in which to play for safety: make use of it.

To lead off to the body advance the left foot and arm, duck to the right, and at the same time bring up the right fist, knuckles upwards, against the ribs or the pit of the opponent's stomach; spring back again to avoid the counter. This is a formidable blow, which if

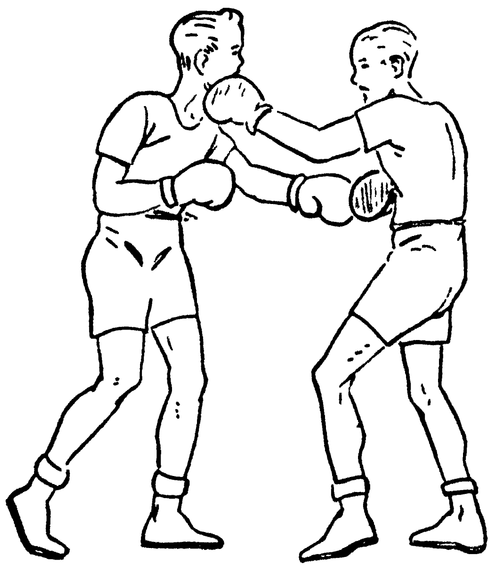


Fig. 4.—Blocking left lead to body and countering with left to jaw

delivered with any real weight behind it is more dangerous than the spectacular head blows. The natural counter to such an attack, of course, is to keep one's guard over the mark and take the blow on the muscular part of the forearm. One may also knock the assailant's left hand aside and then, while he is still coming forward, bring up one's own left to the jaw (fig. 4). Even a weighty left to the jaw may not stop a rush at you, but it will usually break its force. It should be delivered straight forward, not hooked. A half-arm blow or hook, though very effective when it gets home, is rarely so telling as a good straight left.

Tactics.

Each boxer's aim all the time must be to deceive the other. The number of ordinary blows and counters available is very limited; thus there is ample scope for finesse, provided that it is not overdone, for after all the purpose of boxing is to box. One can lead off to the head or body, and then, instead of springing back again, bring up the other foot smartly and at once deliver a second blow to the other vulnerable point, while one's opponent is still moving his guard. Or one can pretend to deliver a blow—feinting, it is called—by flashing out the hand and glove and then either changing direction, or using the other hand, as circumstances warrant. Again, some boxers are very skilful at looking distressed; this frequently makes the other man careless, to his own speedy undoing; in your case, therefore, so long as your opponent is on his feet beware, for the last blow may win the fight! Deception has to be practised under the other man's suspicious eyes, therefore it must be well done. For the same reason, try not to " telegraph " your intentions beforehand; you will find that an experienced boxer launches a blow without the slightest indication of where it is coming from, and that should be your own object also. Practise such swift blows in front of a mirror.

Ring tactics are most important. If possible, study the fellow against whom you are pitted, and learn his style and weaknesses beforehand, working out a scheme to overcome them. In general, when facing an opponent with a longer reach, get in close to him and make most of your own attack to the body. When rushed by a man who seems nothing but a flurry of whirling arms and leaping legs, step aside and stab him off with sharp lefts. When your opponent is stronger, but less skilful, make use of the ring, so as to wear him down. These are the obvious courses; yet many a professional bout is lost because the boxer neglects them. The exact procedure can only be dictated by what you know of your man. If you are knocked down and feel a bit dizzy, stay down till the referee has counted seven or eight; it does not discredit you—you are knocked down, anyhow, and the rest may help you to gather your senses again. Remember, too, that many a champion has received an unlucky hit and been glad after it to play for time. If you are engaged in an important bout, don't pay the slightest attention to the crowd, but only to your seconds and the referee.

American technique, and far too much British technique, too, employs left and right hooks with great liberality. Hook blows are valuable, because they are unbalancing blows; besides, they are difficult to stop, although one can usually take most of them on the arm or glove (fig. 5). But it is impossible to get into a hook all the weight that can be put into a straight blow; the " haymaker " of the average heavyweight, for instance, may knock a man down, whereas

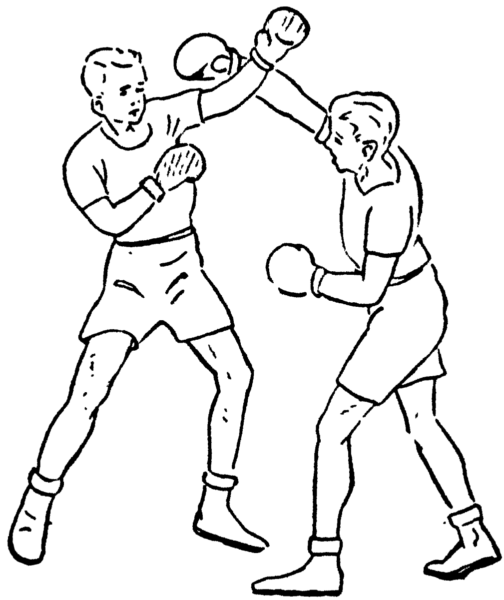


Fig. 5.—Guarding a right swing

if it had been delivered straight and true it would certainly have knocked him out of the ring. But as it is a recognized mode of attack, it should be practised, preferably on a short-hung ball.

The right cross is a vicious and effective counter to an attack, but it has to be properly timed or it will fail. It is executed thus: when your opponent leads with his left to your head, you step forward towards him, ducking simultaneously, so that his glove goes sailing harmlessly over your shoulder. At the same instant you bring your right arm heavily over his left arm on to his advancing jaw. If not properly timed, the opponent may see this coming and,

by changing the direction of his attack, catch you with a left hook (fig. 6).

Always Punch your Weight.

Let us now consider the meaning of weight in a blow. Whatever the power behind it, the most effective blow is one that never travels anything like its full distance. At the full distance, it just grazes

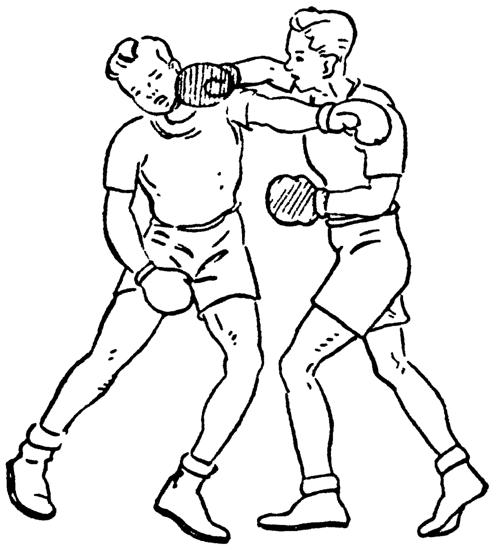


Fig. 6.—Right cross

the opponent; at an inch less he feels a sharp flick, at three inches less he feels more weight, but if it has travelled only a foot or less he receives all the accumulated sting and momentum before any of it has been spent on the air. This of course is the reason why so many left-handed blows, though possible jolting one's opponent, do very little more than annoy him. Therefore, the nearer you are when you get a good blow home, the more certain are you to reap the benefit of it. To " put one's weight behind a blow " means that as the arm travels out, one must swing the body out and forward off the hips with as much " snap " as can be managed. The action is difficult to explain and far from easy to acquire, but it is worth any amount of practice to acquire it. It denotes the hall-mark of the

expert; indeed, many first-rate boxers have never acquired it, but have gone down at the crisis of their careers before less skilled men who possessed a more powerful punch. I am reminded of a famous case of hard hitting. Old Jem Mace fought, when young, in the old prize ring, with the bare knuckles; and at that time men just had to hit hard or go out of the business. When he was sixty-one years of age, he had the temerity to take on Charley Mitchell, reigning champion of England, in an exhibition bout. Now Mace was famous for the severity of his blows, and his " exhibition " hits so stung the younger boxer that he set about the old man in very grim earnest; yet Mace had not the least idea that he was hurting his man! You are recommended to take this lesson to heart. Never smother your punches, always let them go. You can practise upon a pillow filled with flock; smite it hard, up, down, straight out, and with hooks from both hands, remembering, of course, to keep that wrist straight if you do not want to break it. Remember, also, in the ring as well as at practice, that you have *two* hands; the right is not merely a guard, but is often one's stronger arm, and must be brought into action whenever you get the chance. Looseness of the shoulder muscles is essential if one is to transmit a really heavy shock to the gloves.

An upper-cut is a blow delivered upwards with either hand, usually aimed at the jaw; if it catches, not the point of the jaw, but a spot very near thereto on either side, it has the effect of inducing temporary paralysis of the brain, and the receiver may be " knocked out ". You should therefore practise upward blows at the ball.

Other Hints. Training.

In in-fighting, try to be all gloves and elbows to your opponent. Beware of short, heavy blows to the mark or up to the jaw, but try such tactics yourself. Do not " mix it " by in-fighting, as a rule, unless you are heavy enough and strong enough to weather the storm. If you get into a clinch, break away at once; holding is not permitted. But you may hit on the break-away, and such blows are often quite damaging.

If your opponent is known to be particularly dangerous with one type of blow, e.g. a right swing (colloquially known as a " hay-maker "), stand as much as possible where it is most difficult for him to deliver it. Momentary neglect of this principle nearly cost Tunney the world's championship, during his famous second fight

with Dempsey. He forgot the terrible menace of the old champion's right hand, and spent thirteen befuddled seconds on the floor in consequence!

Two more general matters; always keep your mouth shut and teeth set (this lessens the severe jolt caused by blows to the chin); and never lose your temper. Admittedly, to receive a smart punch on the nose brings both tears into one's eyes and wrath into one's soul; but the main object of boxing is to teach lads to control their temper and to endure punishment without flinching.

As to training, the best training for a boxer is to box. He should put on the gloves, if he be keen, with anyone and everyone willing to have a bout; by tackling all sorts of people, tall fellows and short, phlegmatic fellows, fiery ones, he will learn more than from a volume of written instructions. To get fit, let him walk smartly, especially uphill; and skip a lot, dancing about on his toes. If his ankles are weak, let him practise continually going up and down on his toes; even Jack Dempsey had to do this. His actions, when hitting at the ball, or shadow sparring before the mirror, should be slow until he thoroughly understands where both arms and feet are intended to go; then faster and faster, until he has attained the quickest pace, consistent with smart hitting, that he can manage. Speed in boxing is the prime aim of the game. It is no use hitting like a colossus if the other man is not there to receive the blow!

Practise deep breathing, as explained elsewhere in this volume (Athletics, p. 44). Short bursts of quick running on the road are helpful. Attack the punch-ball from every angle; and particularly try hitting it a quick succession of blows with the same hand, e.g. one, two, three sharp lefts, and away. Aim all the time at keeping the body both supple and strong; a fast set at tennis is excellent practice. Finally, if, as the result of long work and many tumbles, you become first-rate, remember the gap you have opened between yourself and the next best man, and be slow to anger. Champion fighters are rarely quarrelsome out of the ring.

SOME FAVOURITE CARD GAMES

GAMES FOR ONE PLAYER

Patience.

Patience is not merely a means of killing time, but in many games requires close attention, skill and card sense. It is a most fascinating pastime when one is alone and has nothing else to do.

Most patience games are played with either one or two packs of whist cards, reduced in size to permit of their being laid out on the table. It should be noted here, once for all, that between games the cards must be thoroughly shuffled, and that during a game the cards in one's hand must not be exposed. An "ascending sequence" is ace, two, three, four, &c., in all or any suits; an "ascending sequence by suits" means that all the cards must be of the same suit; an "ascending sequence, alternate colours" is ace (black), two (red), three (black), &c., or vice versa. Descending sequences start with the king. Other terms will be explained as we proceed.

Single-pack game: The Demon.

This is one of the best single-pack games; the reason for its name will soon be clear to you.

Count the first thirteen cards without looking at them and place them in a pile, face uppermost; this pile comprises your "stock". Expose the next four cards in a row, to start four columns on which succeeding cards as played may be packed in downward sequence of alternate colours. Turn up another card and place it above the head of the left-hand column. This is your first "base". Assume that it is the nine of spades (fig. 1). As the three remaining nines turn up in play they will form the other three "bases". Your object is to build on the four bases in upward sequence of suits, until all the cards have been placed. Commence by examining the layout, moving any cards where practicable. In fig. 1 the ten of spades is available; place it on the nine of spades; this empties a

column, which must be filled at once with any card available, but naturally you play into it the top card of the stock pile, because, until the stock pile is cleared, you cannot know how serious your handicap may be.

No other moves being available, you play from hand, by turning over the first three cards (taking care that you see only the uppermost of the three when they are face upwards). Assume that this one is the ace of hearts. You place it on the king of clubs, turn over three more cards, packing on the columns and filling the bases wherever possible; and so on, till you come to the end of the pack. If now

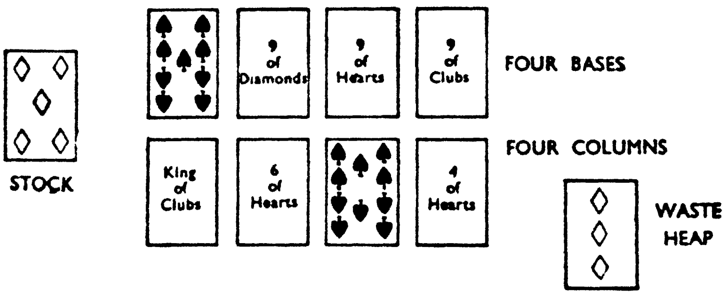


Fig. 1

you have two cards in your hand, you may look at both and play whichever you choose; the other goes to the waste pile. Now turn over the waste pile, without disturbing its order, and go through it again, three cards at a time, as before. If there is a chance of playing three faced cards from the waste pile in succession, it is usually best to play only two of them, otherwise at the next turn of the waste pile the order will not have changed. If at the end you get all the cards on to the four bases, you have won the game.

Single-pack game: Ten-to-One Patience.

This is so called because the odds are ten to one against success. In the U.S.A., gamblers sometimes "sell" a pack for fifty-two dollars and repay five dollars for every card got out, and on the whole they probably make a profit.

Lay out seven cards in a row, six concealed, but the seventh face upwards; then a row of six, then one of five, and so on down to one (fig. 2). Only exposed cards may be moved. If any aces

have been exposed, move them to the right to form the four bases, and expose the card immediately above. On the seven columns

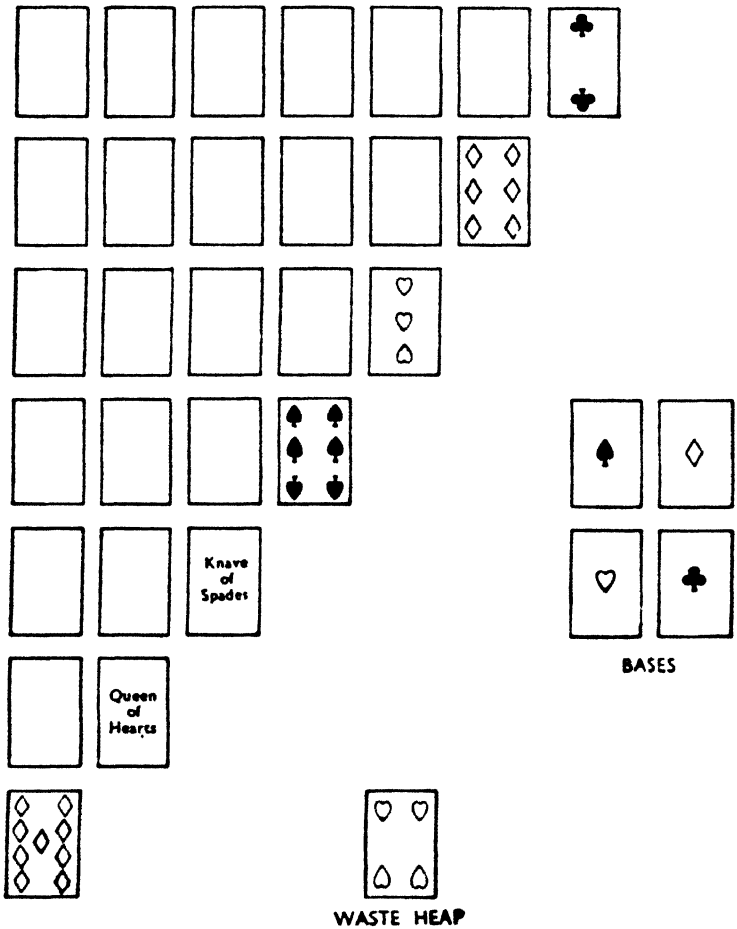


Fig. 2

you may build in downward sequence of alternate colours, and to help the game you may move any part of a sequence to another column (provided, of course, that it fits); but even then the chances of success are much against you. Now play from hand, one card

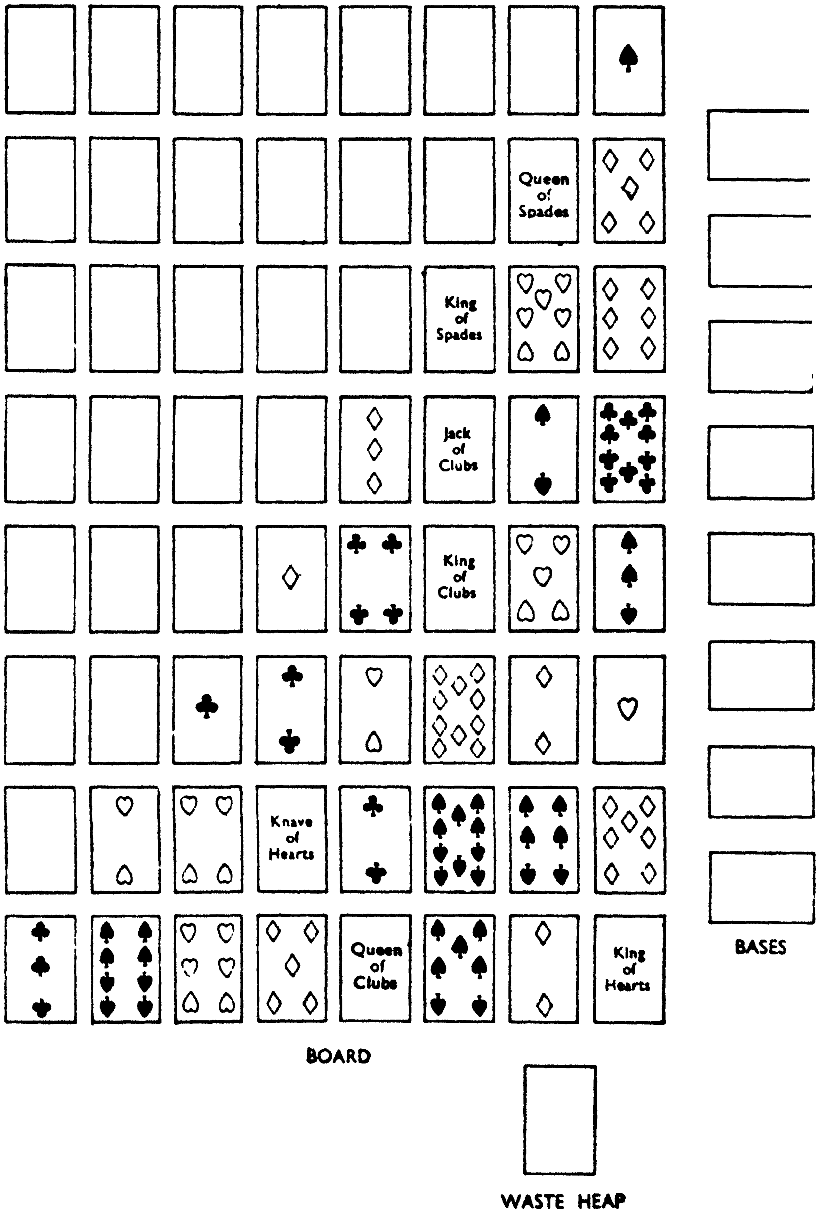


Fig. 3.—Square-of-eights Patience

at a time, building whenever possible. When a column is emptied, the first available king is to be played into it; if the king forms the head of a sequence on another column, move the whole sequence. Until a king turns up, the column must remain empty.

If the game is successful, you will have four bases with the kings as their top cards. If, however, you have not done this when you reach the end of the pack, no second turn is allowed, and you have lost the game.

Two-pack game: The Square of Eights.

Patience games with two packs are vastly better and more difficult than single-pack games; the present one is fairly easy if played with care.

Take one pack first, and lay out eight cards in a row, seven face down and the eighth exposed, then a second row with the last two cards exposed, a third with the last three cards exposed, and so on to the end of the pack. Continue with the second pack, the eighth row of course having all eight cards exposed (fig. 3). If there are any aces in this row they may now be removed, to form bases on which you build in sequence of suits. The " board " may be packed in downward sequence of alternate colours; thus, in fig. 3, the six of hearts goes on the seven of spades, and the queen of clubs on the king of hearts. Parts of sequences may be moved, the object being both to free cards of low values and to expose the concealed cards. Only kings may be played into a vacant column, but of course if a king has below it a sequence of other cards, the whole sequence may be played into the vacant space. Only the bottom card of any column may be played to a base.

When the cards are packed as far as you consider advisable, play from hand to a waste heap (or, if the card will fit, to a sequence or a base). If, when you reach the end of the pack you cannot complete the eight bases, you have lost the game.

Two-pack game: The Princess.

Shuffle two packs together. Lay out a square of sixteen cards in four rows on your left hand, each row from left to right, then lay out a second square of sixteen cards on your right hand, counting each four from right to left. In the space between, aces as they turn up are to be played, to form bases for building in sequence of

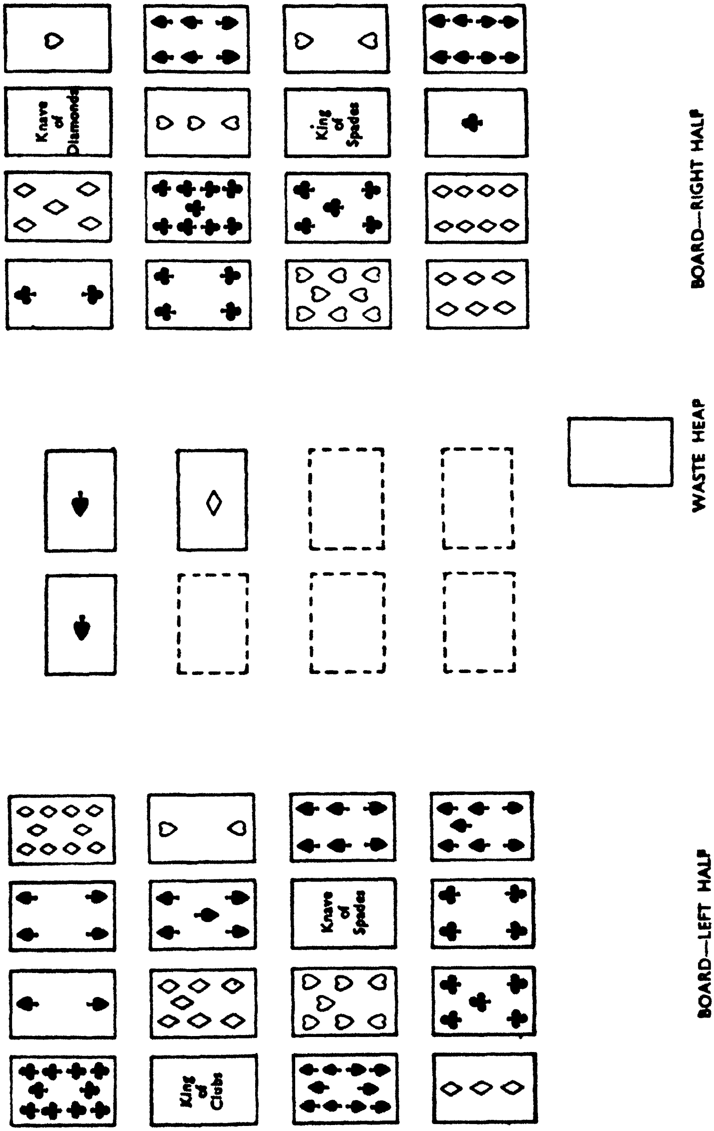


Fig. 4.—Princess patience

suits. You may only use for packing the four inside cards on each side (in fig. 4, for instance, the ten of diamonds, two of hearts, six of spades, and seven of spades in the left-hand square, and the similarly situated four cards in the right-hand square). You may build on these in order of suits, in descending sequence, but only one card at a time; thus you may place the six of spades on the seven, but it must cover it completely. If now, playing to a waste heap, you turn up a five of spades, you would play it on the six; and if you had a base of spades in the centre, comprising ace, two, three, four, then you could play the five, six, and seven on it, or as many of them as you thought wise.

No chances must be lost with the Princess, but once you have been through the pack, you are allowed to pick up the waste heap and go through it a second time, after which, if the bases are not complete, you have lost.

When a gap in an inner column occurs you may fill it or not as you prefer; but this gap permits the exposed card in the third column to be played, and if that card were played it would free its neighbour in the second column, and so on. It is wise, therefore, to get a gap as quickly as possible, and to keep it open; for it frequently happens that the game is blocked by these inner cards not being available. Of course if two such cards, say the sixes of diamonds, have two diamonds of higher value blocking them, there is no possibility of removing the block, the game is hopeless, and it should be abandoned.

GAMES FOR TWO PLAYERS

Cribbage.

Cribbage, perhaps the best of card games for two players, requires a pack of fifty-two whist cards and a cribbage board. The score is marked by pegging the board, once up and down the board counting sixty-one, twice round being 121.

Cut for deal, ace low; the lowest is dealer, and his opponent at once gives himself three holes, to counterbalance the disadvantage of not "holding the crib". Five cards are dealt singly to each player, face down. Both players pick up their cards, consider their value (see below), and discard two of them, which are placed on the table face down; these comprise the "crib". The non-dealer now cuts the pack and the dealer turns up the first card and places it on

top of the pack. This card is the " start ". If it be a knave, the dealer pegs two holes, saying " two for his heels ". The non-dealer then plays his first card.

Combinations of cards have different values, and the object, both in discarding to the crib, and in playing one's hand, is of course to score as many points as possible, and at the same time to prevent the opponent from doing so. These are the values:

Ace counts one, the other cards whatever may be their number of pips; knave, queen and king each count ten. Whenever you can play a card which with the one last played by your opponent makes fifteen, you say " Fifteen, two ", and move your peg two holes. If you can pair the card last played by your opponent, e.g. play three of spades after his three of anything, you call " Two for a pair ", and again move your peg two holes. If now your opponent can play a third card of the same value, he claims " Six for a pair-royal ", and moves his peg six holes. Finally (a rather rare thing), if you can again play the same value, making four successive cards of that value in all, you claim " Twelve for a double pair-royal ", and move on twelve holes. In pairing, kings must be paired with kings, queens with queens, &c., not with tens.

Points can also be scored by a run of three or more cards. For instance, you play the five of anything, your opponent lays down a seven, and you then play a six; this counts " three for a run ", even though they were not played in correct order. The maximum possible for a run is seven, i.e. ace, two, three, four, five, six, seven, regardless of suit.

Let us now play a typical game. The cards having been shuffled, dealt, the crib made, and the pack cut, the ' start ' being knave of diamonds, " A " (non-dealer) examines his three remaining cards. They are a poor lot, being king of diamonds, seven of diamonds, and eight of spades; poor because he cannot play one of them without making it likely that his opponent will score " fifteen for two ". He plays the king and calls " Ten ". " B ", the dealer, has already pegged himself " two for his heels ". His three cards in hand are the king of clubs, ace of diamonds, four of diamonds. He plays the king, saying, " Twenty; two for a pair ", and moves his peg two holes. " A " plays the eight of spades, saying " Twenty-eight ". " B " plays his ace, saying, " Twenty-nine ". In cribbage one does not score higher than thirty-one; if one can score thirty-one exactly, one claims two points. As " A " 's remaining card would make thirty-

six, he passes, saying "Go". As "B" is in the same predicament, he says "I cannot; one for last card", and gives himself one hole. "A" now counts his cards, seeking to get the utmost value from their combinations. They were, as we said originally, a poor lot; all he can claim is "fifteen, two". If, however, the eight of spades had been a diamond, he could have claimed "four for a flush". In counting, he adds whatever advantage can be derived from the start card. [If, for instance, one of his two ordinary cards had been a five, he could have claimed "fifteen, two" (i.e. king-five), "fifteen, four" (knave-five).] Actually, as we have said, all that he gets is two. His cards are then discarded, and it is the dealer's turn. He holds king, ace, four, so he calls "Fifteen, two"; but, since there is also the combination knave, ace, four, he continues, "Fifteen, four". (There is one other possibility that frequently occurs. Assume that the start, instead of being a knave, is some other card, e.g. six of clubs, and that one of the players has in hand or in the crib the knave of that suit, he claims "one for his nob".) Continuing, the dealer now turns up the crib; the four cards are equally disappointing, being queen of spades, three of spades, eight of diamonds, eight of clubs, i.e. they have a value of two holes only. He therefore says "Two for a pair", and the hand is over. His opponent deals the next hand, and so on alternately, until one or other player reaches sixty-one.

The first point to be watched in cribbage is what you throw into the crib. The three cards that one has in play, with the start, make four in all; but the four cards in the crib, with the start, make five, and there is a vastly greater number of possible combinations using five cards than four. The dealer, therefore, who holds the crib, should play into it cards likely to count, such as a pair; but his opponent should play into it such cards as he thinks will spoil the crib, even though it weakens his own hand. To the dealer, a five or ten, or a court card, may be valuable in the crib; because there are twelve court cards plus four tens in the pack, so that there is a good chance of one of these being turned up as the start. The non-dealer, on the other hand, avoids discarding such cards for the same reason.

The next point is what to lead when you have to play first. Do not ordinarily play a card which will enable your opponent to score "fifteen, two", unless you can see an advantage to yourself in it. It all depends on your hand. Suppose you have ace, three, ten. Throw

away the ace or three. "Runs" also need watching. Suppose that you have played a six, your opponent a seven, and you an eight; you then claim a run of three; but if your opponent has a six, seven or eight, he now plays it, and claims "double run", i.e. six holes, and in addition he can claim "two for a pair".

In counting the crib, one cannot claim a flush unless all five cards are of the same suit, but then the flush counts five points.

The following are a few high values which can be obtained from one's cards:

Combination	*Total*	*Reckoning*
Three fives, one knave, plus one five on the "start" of the same suit as the knave	29	Fifteen eight, plus fifteen eight, plus a double pair-royal, plus one for his nob.
Three fives, one knave, plus one five on the "start" which differs from the knave	28	Fifteen eight, plus fifteen eight, plus a double pair-royal.
Two fives, two fours, and a six	24	Fifteen eight, two pairs, and four runs of three.
Two fours, two sixes, and a five	24	The same.
Two sevens, two eights, and a nine	24	The same.
Four threes and a nine ..	24	Fifteen twelve, and a double pair-royal.
Three fives, a four, and a six	23	Fifteen eight, a pair-royal, and three runs of three.
Three fours, a five, and a six	21	Fifteen six, a pair-royal, and three runs of three.
Three eights, a nine, and a seven	21	The same.
Two sevens, an eight, and two nines	20	Fifteen four, two pairs, and four runs of three.
Two fives and three court cards of the same kind (or three tens)	20	Fifteen twelve, a pair-royal, and a pair.
Three threes and two sixes	18	Fifteen ten, a pair royal, and a pair.

Another form of cribbage involves the dealing of six cards to each player, so that four cards remain to be played. This naturally

involves higher scores, and the game is made 121 points. In this game the non-dealer does not take three points at the start. When thirty-one has been attained (two points) or one point taken for last card, the loser leads once more from zero with one of his remaining cards.

Bézique.

Despite its rather involved method of combining and counting the cards, this is an excellent game. A set of proper Bézique cards is usually provided with markers; but one can play equally well with a sheet of paper and two ordinary whist packs, the backs of which must be identical. Remove all the twos, threes, fours, fives and sixes, leaving thirty-two cards in each pack. The values of the cards are as in whist, with one important exception, ten being next highest after the ace; the order is, ace, ten, king, queen, knave, nine, eight, seven.

Shuffle the packs together, cut (highest dealing), and deal eight cards to each player, first three at a time, then two at a time, then three at a time. Lay the seventeenth card face upwards on the table; it is the trump suit for that hand. Place the rest of the pack face downwards beside it, to form the " stock ". The eight cards in your hand must now be studied, bearing in mind the following values:

4 Aces score 100.	A Marriage (king and queen of the same suit, not trumps) scores 20.
4 Kings score 80.	A Royal Marriage (king and queen of trumps), scores 40.
4 Queens score 60.	Bézique (queen of spades and knave of diamonds) scores 40.
4 Knaves score 40.	Double Bézique (both queens of spades and knaves of diamonds) scores 500.

Sequence in Trumps (ace, king, queen, knave, ten) scores 250.

Seven of Trumps, whether turned up, declared, or exchanged, scores 10.

Last trick scores 10.

Aces and tens in hand after the hand is over, are each also worth 10.

The object of the game is to score an agreed number of points, e.g. 2000.

In play, the non-dealer leads off with a card, and his opponent plays to this either another card of the same suit or any other of

his eight cards; if the second player's card is higher, or a trump, or a higher trump, he takes it and lays the two cards down beside him, face downwards, to form a pile which will not be touched till the hand is finished. After taking a trick, but not before, a player may " declare "; for example, if he has a king and queen of the same suit, he may lay them down on the table, face upwards, before him, and call " Marriage ", at the same time giving himself twenty points; similarly with four aces, or bézique, or any other of the combinations listed above. The cards thus laid down are available for play; for instance, if you have an ace lying on the table, and your opponent plays a king of that suit, you may take the trick with this ace; or, of course, you may throw away any card, by losing a trick, if you prefer. Tricks count nothing in themselves. At the end of a trick, and after the winner of it has made any declaration, the seven cards that each holds are brought up to eight once more by the players taking one from the stock, the winner of the last trick taking the first. In taking tricks, bear in mind that you will need your trumps at the closing stages of the hand, and also that you should capture any aces or tens offered during the play; these two objects clash, and you often have to decide which to pursue. You need not make a declaration unless you wish to do so. Suppose that you hold three kings and a " marrying " queen; you may think it better to hold them in the hope of picking up a fourth king, and so scoring eighty. The cards used for one declaration may be used again at a later phase for another, but not the same cards; e.g. in the case just cited, you lay down your four kings and claim eighty. When next you win a trick, you may now lay down the queen and marry her to the relevant king, claiming twenty. If more than one declaration is made, all the cards employed must be different; for instance, if holding king and queen of spades and knave of diamonds, you cannot declare " Marriage " and " Bézique " at the same time—for that you would need both queens of spades. But when next you win a trick, you may join the queen to the knave and declare " Bézique ".

When the last cards are taken up from the stock, the winner of that trick claims ten for " last trick ". It is not really the last trick, since both players still hold eight cards in hand or on the table; these are then played off, with the obvious aim of capturing the other side's aces and tens, but before playing, all those on the table are taken into the hands. In playing these eight last cards, you must

follow suit if you can; only if unable to follow suit may you trump. The two waste piles are then turned up, each player counting the number of aces and tens which he holds, and giving himself ten points for each. The deal now changes hands; and the game continues until the agreed total has been scored.

A specimen game may make these remarks clearer.

Assume that you have dealt, and that your eight cards in hand are ace and seven of spades, king and knave of diamonds, queen and ten of hearts, queen and nine of clubs; the exposed trump is the queen of spades.

Naturally you want the queen of spades, not only to make a Bézique, but also because it gives you three queens, the possibility of soon getting three marriages or four queens, and the less likely chance of the most valuable prize in the game, Double Bézique. You have the means of taking that queen, by exchanging the seven of trumps for it, and at the same time scoring ten; no other card may be used for this purpose. But you cannot make the exchange until you have won a trick. Your opponent leads a low diamond. You take it with the king, turn both cards over to start your "waste" pile, and declare "exchange", picking up the queen of spades and laying down the seven in its place. You do not declare Bézique yet, hoping to gain more by waiting. As winner, you now pick up a card from the stock, your opponent takes another. Your pick-up is the queen of diamonds, thus giving you four queens, besides a marriage. As winner of the last trick, you play first, laying down the nine of clubs; it is useless to you, and, the game being early, you have plenty of time for declarations later. Your opponent is wily, however, and being anxious to find what you have in hand, he throws away some small diamond or heart. You take the trick, place the two cards on your waste pile, declare "Four queens", lay the royal ladies down face upwards before you, and mark sixty points. You then pick up another card from the stock, your opponent does the same, and you lead. Again your opponent lets the trick go, so you pick up the two cards once more, place them on the growing waste pile, call "Bézique", and lay down your knave of diamonds, pairing him with the queen of spades which is already on the table. So the game continues to the end. If at a later stage you held the king of spades, and won the trick, you could lay him down, pair him with the Bézique queen, and claim forty for a royal marriage. Naturally you would not do this unless you were certain that you stood no

chance of still getting Double Bézique. Another way to get a high score in one declaration, is to collect trumps for a sequence—ace, ten, king, queen, knave; but you will almost always find that something has to be sacrificed, so that your judgment is constantly coming into play to decide what best to hold and what to let go.

As regards the two sevens of spades, the one which turns up in play counts ten; the one which (in our specimen game) was lying on the table, goes to the loser of the last trick, and he can claim ten for it.

Remember to hold your small trumps at the beginning of a hand, so as to capture an ace or ten when needed.

You may lead a round by playing from the faced cards before you (if any), or your second card may be played from the table; but on commencing a trick the cards in your hand, when added to any on the table, must total eight, otherwise something is wrong.

No declarations can be made when playing the last eight cards.

If you lead a card (for example, the eight of diamonds), and your opponent plays the second eight of diamonds on it, the trick is yours; only a higher card or a trump can take a trick.

Stop!

This game, played with two packs of ordinary or patience cards, owes its name to a player calling " Stop!" each time that his opponent makes a mistake, a call by which he himself can take up the play.

Each player has one pack, and the penalties are imposed from the very start, so carefully master the rules.

Cut for deal, highest dealing. The first player deals twelve cards face downwards, one after another, and places a thirteenth card face upwards on top of them; this pile comprises his " stock " (fig. 5). To the left of the stock he next lays down four cards in a perpendicular line, face upwards; on this line he builds in downward sequence in order of suits. If any of the exposed cards be an ace, he places it in front of him, as the first of four piles which, in suit sequence, must be built up to the king. In the vacant space he places the top card from the stock. He then turns the next stock top card up. If any faced card can be played to an ace it must be moved; if not, and one card in the line will go on another (e.g. in fig. 5 the two of diamonds on the three) it must be moved. When no more moves are possible, he turns up the first card from his hand, and if he can use it he does so; if not, he places it before him face up-

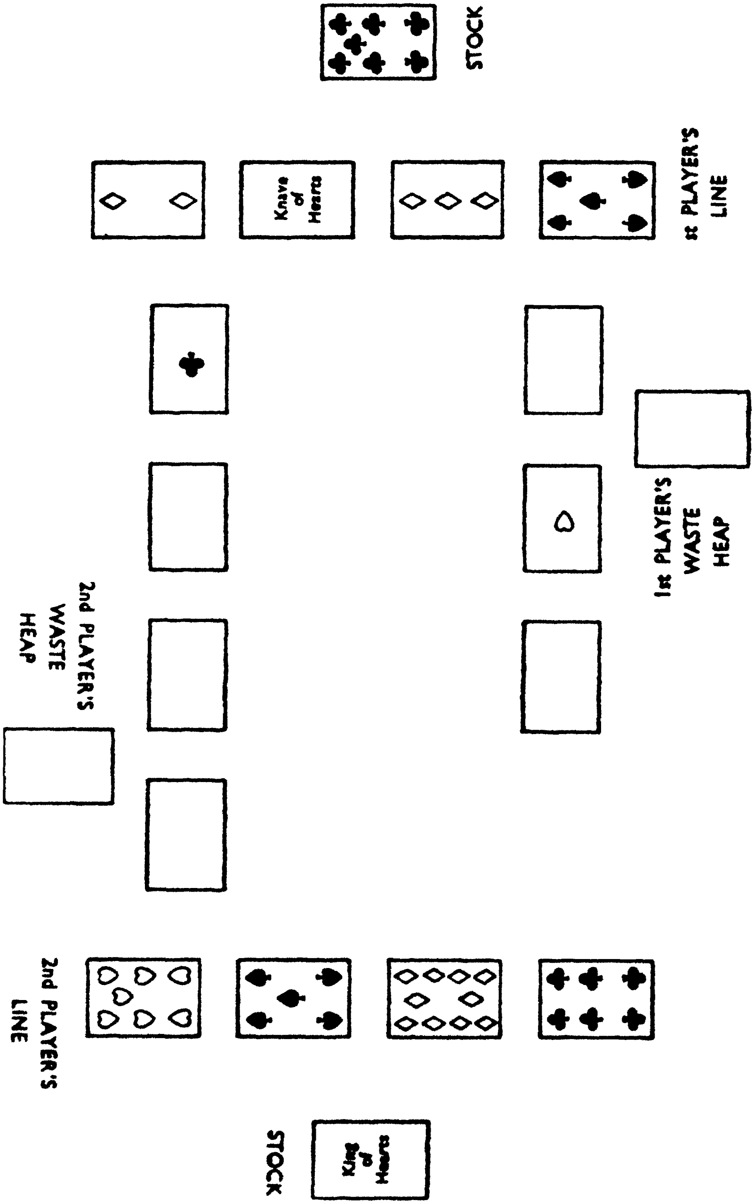

STOCK
Knave of Hearts
st PLAYER'S LINE
1st PLAYER'S WASTE HEAP
2nd PLAYER'S WASTE HEAP
2nd PLAYER'S LINE
STOCK
King of Hearts

Fig. 5.—" Stop!"

wards to form the beginning of a waste heap. He then turns over one more card from his hand, and if that also is unplayable, lays it on the waste heap; and the lead passes to his opponent.

The second player now constructs his stock of thirteen cards, exactly as the first; but if the thirteenth card will go on the opponent's aces or lines it must be played and the underlying card faced. He then lays out his own vertical line of four cards, takes out any aces, and continues until he too has started a waste pile. When he can move no more, the lead passes to his opponent, and so on, until all the cards are played. The waste heap is then picked up and played again, as many times as may be necessary to completely exhaust it.

Whenever either player makes the slightest mistake his opponent calls "Stop!" and takes over the lead. One *must* play, not only to one's own cards, but to all the exposed cards on the table, and in the correct order, according to the following rules:

1. Cards must be played to the ace piles rather than to the lines, and to lines before waste heaps.

2. The first card to be so played is the stock card; only when the stock card cannot be played are you allowed to play from the line; and only when you cannot play from the line may you play from the waste heap.

3. As soon as a vacancy in either line occurs it must be filled from the stock pile; only when the stock pile is exhausted may the vacancy remain unfilled.

4. Always turn up the next card in the stock pile before playing any other card, after the top card of the stock has been played.

5. Although you must play to your opponent's pile or aces if you have nowhere else to play a card, or if you think you will gain by giving it to him, you cannot take any of his cards from stock, line or ace packets to place on your own.

6. Cards *must* be played one at a time. For instance, if you know that one of your line packets comprises king, queen, knave, ten of diamonds (the ten of course being uppermost), and the top card of an ace packet is the nine of diamonds, you must play first the ten, then the knave, then the queen, and so on, you must not pick them all up together.

Once the rules have been mastered, this game can be played rather fast, with amusing results.

GAMES FOR THREE OR MORE PLAYERS

Rummy.

Although Rummy can be played by two people only, a much better game results from three, four or more players. This is a game of watching chances, so as to declare one's hand at the right moment.

Shuffle two whist packs together, including both jokers. Cut for deal, ace low; then deal the cards round singly until each player has ten. The next card is placed face upwards on the table, with the rest of the pack face downwards in a heap beside it.

Examine your hand to see if you have three or more cards of one kind, e.g. three fives; also see if you possess a running flush in one suit, i.e. three or more cards such as the five, six and seven of spades; for one object of the game is to get three or more cards of one value and/or a running flush. If you hold a joker, you may make it any card you like, to suit your hand; but should you still possess it when somebody else calls " Rummy!" it will count fifteen against you.

The player on the dealer's left begins the game by picking up either the exposed card or the top card of the pack. If this card fits the combinations he is planning he keeps it; if not, he discards it face upwards, placing it beside the pack on top of the faced card (if there is one). The next player now takes either the uppermost exposed card or the top one from the pack and examines *his* hand, discarding or not as it suits him; the third player does the like, and so on. The object being to lay down part or all of your hand first, it is desirable not to declare a combination at once, unless you are afraid that somebody else will do so; for the cards must be laid face up on the table in front of you, and your opponents can play to them. Suppose, for instance, that you are collecting threes and tens, and that you have three threes and two tens (besides four temporarily useless cards). You lay down the three threes. The next player has had a remarkably lucky pick-up; he holds the nine, ten, jack, king of diamonds, one joker, three sixes, and two threes. He picks up the eight of diamonds from the pack, calls " Rummy!", and lays down his cards, making his joker into the queen and playing the two threes to the end of your three threes. You and all the other players then have to count up the total pips on your cards in hand,

which count against you. Each court card counts ten and any aces eleven points each.

It is more usual of course for play to go on for some time before anyone can call " Rummy!". One may play a card or cards on to the end of either his own tabled cards or on those of his opponents; or one may exchange a joker for any card on the table; or, if a joker lies on the table as part of a combination, it may be picked up, provided that the player can place the true card in its place. This last contingency often helps one to form a set of three cards when nothing useful will turn up from the pack.

In one variety of the game, the twos are reckoned as additional jokers; but if caught with them at the end, they count eleven each against you.

One excellent variation of Rummy is for no player in the second hand to lay down a card until he can play *two* sets of three cards; in the third hand no player to lay down until he can expose three cards and four cards together; in the fourth hand, no player to start until he can expose two fours; and in the fifth (final) hand, no player to expose his cards until he can play a sequence of five cards. This game results of course in some heavy scores.

Dummy Whist. See below (" Whist ").

GAMES FOR FOUR PLAYERS

Whist.

Almost everyone knows how to play Whist, and in the brief space at our command we can only draw attention to one or two points of the game.

The four players cut for deal, ace low; if two or more cut the lowest card they must cut again. The dealer shuffles the pack, the player on his right cuts, and he deals the cards singly. Always keep the cards down near the table, for alert players cannot help noticing them if you hold them up. It is bad form to pick up one's cards while the hand is being dealt, and it is foolish to sigh if one receives a bad hand—smile rather, so that your opponents may imagine that you have a good hand. In the event of a misdeal, the cards must be redealt.

If we disregard the honours game, Whist consists in one pair of facing players obtaining a majority of the thirteen tricks. The rules

of play are perfectly simple: you must follow suit if you can; the highest card played takes the trick; those who cannot follow suit may trump if they choose, in which event the highest trump takes the trick. At whist drives it is usual to play twenty or twenty-four hands; in the latter case 180, in the former 160, is a moderately high score. If playing at a whist drive, you must follow exactly the rules announced by the M.C., or you may forfeit any prize for which you have qualified. Do not speak during the game, and on no account throw down your cards because you think that you hold all the remaining tricks; a hand should always be played out.

To determine trumps, some dealers (by agreement) turn up the last card, which is made trumps; they then take it into their hand before commencing play. This mode of deciding trumps is objectionable, because it may disclose valuable information. The best way is to cut a spare pack for trumps, the players cutting in turn, a new player for each new hand; the cut should be made after the cards have been dealt.

The first problem is the lead. The object of the lead—indeed, of any lead—is to capture the trick yourself or make it possible for your partner to do so; if by a convention you can at the same time inform him of the state of your hand, so much the better, but of course at the same time you inform your opponents. The question of informative leads at whist is a vexed one. You may, for instance, play the king of trumps, in which case your partner will presume that you also hold the ace; or you may play an unnecessarily high card when you are not leading, which he will take to mean that you want trumps played at the first opportunity; and so on. We have not space to deal with these conventions here. They are important factors in improving one's game; but everything depends on your partner; if he does not know the conventions your efforts will have been wasted and may ruin the game. Some experience prompts me to urge young players to practise a sensible, straightforward game; the rest will come naturally, if they possess any " card sense ".

Suppose that you have to open the game, and that you hold ace, king, and two other trumps, and five or six cards to the ace in a strong outside suit. Naturally you will play your ace and king of trumps first; the hand is unbalanced, but you may draw eight trumps, leaving you with two, against three in the other three hands. What follows of course depends not only on where those three trumps lie, but also on what they are. If your partner has played the queen his

trumps are exhausted; if he has not, it is best to disclose your strong hand, and then to play your smallest trump; if your assumption has been correct, you will be left with the master trump, and the prospect of making all your outside long suit. Remember, however, that you have a partner; what is weakest in your hand may be strongest in his, so that if the game warrants it you must play to him. It is vital in whist to remember every card played; this is quite easy to do, if one concentrates on it. How often towards the end of a hand does one notice players hesitating whether to play a master card or not, because they cannot remember whether the next highest has fallen already.

Here are a few Do's and Don'ts. If you are the second player, and can follow suit, you should, as a rule, play a low card; not invariably, however, for you may hold the ace of the suit led and be able to gather the lead into your own hand advantageously. If, as second player, you cannot follow suit, whether or not you should trump depends upon circumstances; but of course a trick lost to you is one gained by the other side. If you think the third player must follow suit, play your lowest trump; if convinced that he will trump it, play a high one. Tricks win the game; and a trump can only make a trick once. If you are third player, your normal duty is to play high, unless of course your partner has led the master cards in the suit, when you play low, or throw away if you cannot follow suit. When discarding in such circumstances, play the lowest card of your weakest suit. If, on the other hand, it is your opponents who are leading in the trick, and who want trumps (which you do not hold), play the lowest card of your strongest suit. The strongest suit, by the way, is the one of which you hold most cards. Suppose, for example, one player to hold ace, king, queen of spades, and another the two, three, four, five, nine and ten; the lower six cards are of equal value if they can be played, for three of them will fall on the court cards and the other players will certainly have played the rest. If, as third player, you take a trick, return your partner's lead, even though it seems to you that you should not do so. After some experience, you may defer returning the lead until you have made certain of some ace or king which you are burning to play; but even then, you should return the lead at the next round. Lastly, always notice where the lead lies in relation to the strongest opposition; if this is the second player, by "playing through" him you give your partner a chance to capture anything which he may lay

down. If you are fourth player, your position is simple, your duty being merely to take all the tricks you can; but don't trump your partner's master card, or you will become exceedingly unpopular!

Finally, and for the second time, *remember the cards*, and reason out to yourself from what falls on the table where the rest of the pack lies. An excellent help in this task is the game of

Dummy Whist.—This is a game for three players. It is played exactly as whist, except that each player in turn holds the dummy. After the cards are dealt, the dummy hand is laid out, and the holder, who sits opposite, plays from dummy in its proper turn. Dummy whist is an excellent game, because it teaches one what to play if the dummy is to gain, and what dummy must lead in order to benefit oneself. Dummy whist also helps in mastering the difficult game of bridge, which we have not the space to deal with here.

Solo Whist.

This, one of the very best card games, is so called because each player plays for himself, except in the one case noted below. The cards are not shuffled so thoroughly as in ordinary whist, and are dealt three at a time; if over-shuffled, they become so mixed that one cannot, as a rule, receive a strong hand. Trumps having been decided, the player on the dealer's left has the first call. If he feels that he can make five tricks he calls " Solo ". If he feels that he can lose every trick, he calls " Misère "; if his hand is so bad that the misère seems a certainty, he calls " Misère ouverte ". Should he hold a long suit, which with other high cards looks like yielding nine tricks, he calls " Abondance ". Finally, if this long suit is trumps, he calls " Royal Abondance ". In the case of an ordinary Abondance, he declares the strong suit before play begins, and that suit becomes trumps. There is one other call. Should you be fairly strong in trumps, but see only four tricks in your hand, you may (by agreement) " Propose ": the common word is " Prop ". If any of the other players also sees four tricks, other than trumps, in his hand, he may accept, in which case he says " Cop ". " Prop and Cop " is the lowest call, and is only admitted in order to avoid redealing. It counts eight tricks to the partners. In the preliminary calling, Misère is a higher call than Solo, Misère ouverte higher still, Abondance is above that, and Royal Abondance highest of all. If all the players decline to call, each says " pass "; the first player then may reconsider his hand. If he decides still to pass, the cards

are shuffled, cut and redealt. In Misère ouverte, after the first four cards have been played, the caller must lay down his twelve remaining cards for all his opponents to play against as best they can.

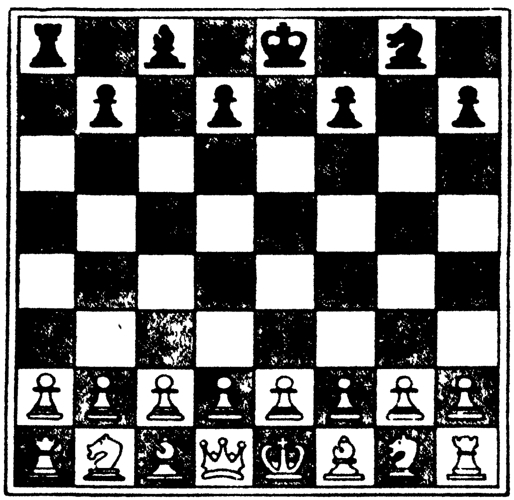
The important thing in Solo Whist is to remember that it is almost mathematically exact. Either you have a good hand or you have not; and against sound players, if you " hope " to make the decisive trick, you are likely to be undeceived. For instance, a good solo hand is ace, king (trumps), ace, king, ace; but it is often defeated. Misère is a very pretty call to which to play. Do not call Misère if you have a high card, the only one of that suit, still less if you have two; they will almost certainly be found out, you will be compelled to take a trick with them, and will have lost your call. A common fault is to declare Misère when one has a long suit, the lowest card of which is the three. Another player may possess just as many of that suit to the two, so that you will be forced to take a trick in the end. When calling Abondance, remember that one cannot make an Abondance on eight tricks; this is another very common fault. The cards look so nice, with all the honours and high pips; but unless they add up to nine tricks, leave it alone.

One more hint. In solo, if you have made the call you must, as a rule, play trumps first, i.e. you must disarm your opponents before they have a chance to trump. Finally, as in Whist, it is quite useless to take up this game seriously until one has acquired a " cards memory ".

CHESS

Chess, the game of kings and the king of indoor games, requires close attention and much practice if one is to become a good player, but the effort is well worth while, and the pleasure of winning a hard-fought game of chess will provide many a happy interlude from our more serious worries later in life. The game is played all over the world, and it is quite common for two people who have never met to indulge in a game by correspondence.

BLACK



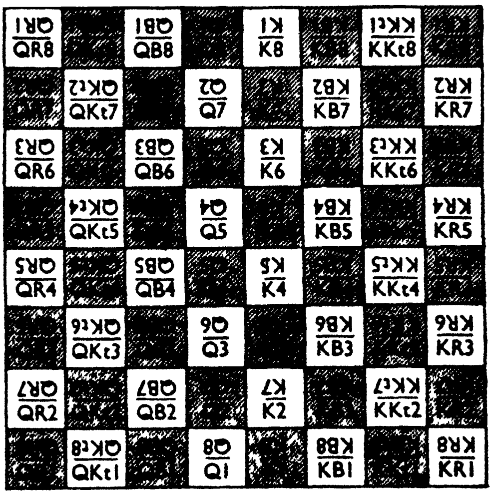
WHITE

Fig. 1—The board.

The board (fig. 1) contains 64 squares. It must be placed so that there is a black square on each player's left hand. In diagrams it is usual to show White at the bottom of the board, but the beginner should always play his practice games from both sides, otherwise he will be severely handicapped when it is his turn to play Black. White invariably has the first move.

Each player has an army of 16 for the mimic battle of chess, 8 pieces occupying the horizontal row nearest to him, and 8 Pawns (P) on the next row in front. The pieces comprise a King (K), a Queen (Q), two Bishops (B), two Knights (Kt), and two Castles or Rooks (R). Notice that the White King occupies a black square, the fourth square from White's right hand, and that Black's King opposite occupies a white square, the fourth from Black's left hand.

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WHITE

Fig. 2.—Notation

The object of the game is to capture the opponent's King. He is never really captured or removed from the board; but when his capture has become inevitable in a move or two the winning player announces "Checkmate!". When play is equal and it is obvious that a decision is not likely to arise (except from some absurd mistake), to save time the game is usually abandoned by mutual consent as a draw. A draw may also be forced by the losing player in some circumstances, or the game may end in a "Stalemate"; these are explained below.

The first point to master is the notation. In order to record

games of chess, and to study the innumerable variations in the play, the squares on the board are numbered; the notation used in this country is shown in fig. 2, the men having been removed for clearness. Each vertical file bears the name of the piece which commands it on commencing the game, the squares being numbered from 1 to 8. Thus the White King's square is K 1, the next in front is K 2, and the eighth (where Black's King stands) is K 8; similarly with all the other pieces, the Bishop and others on the King's side being called K B, K Kt and K R, those on the Queen's side Q B, Q Kt and Q R respectively. Black records *his* moves in precisely the same way, but turns the numbering of the files upside down. His King's square is K 1, and the square occupied originally by White's King is (to Black) K 8. Pawns take the name of the file on which they stand, e.g. the King's Pawn is K P, and it is placed originally on K 2.

This notation not only enables us to conduct games by correspondence, but allows us to play over the recorded games of the great chess masters, which is perhaps the best of all ways of learning the game.

The moves take a little remembering. No piece or Pawn may move to a square which is occupied by any unit of its own colour; and no piece except a Knight may jump over a piece into an unoccupied square. When a piece or Pawn is captured, it is removed from the board, and the opposing unit which captured it takes its place. If you touch a piece, your opponent may insist upon its being played, unless you announce that you are only adjusting it; and if you cannot legally move the piece, then you must (if practicable) move your King. It is extremely bad form for spectators to comment on moves during the progress of a game.

The *King*, commander-in-chief of your army, moves one square at a time only, in any direction; but he may not move into check (see below). Once in the game, and once only, he has the privilege of moving two squares; this is called " Castling " and is explained below. At the beginning of a game the King has to be protected from the onslaught of the enemy, and he moves very little; but in its closing stages his moves are of immense importance, require much thought, and may make all the difference between your winning and losing.

The *Queen*, the most powerful piece on the board, moves like the King in any direction, but unlike him may move any number of

free squares that you desire. To lose her is a first-class disaster, so always keep an eye on your Queen. If you place the White Queen in fig. 1 at Q 3, you will notice that she commands all the squares to Q R 6, and can, if need be, take the opposing Queen's Pawn or King's Rook's Pawn; but, of course, she would not do so, since the only justifiable exchange is a Queen for a Queen.

The *Rooks* move either vertically, straight forward or backward, or horizontally on either side, any number of vacant squares.

The *Bishops*, whose value is rather less than that of Rooks, move any number of squares, but only along diagonals.

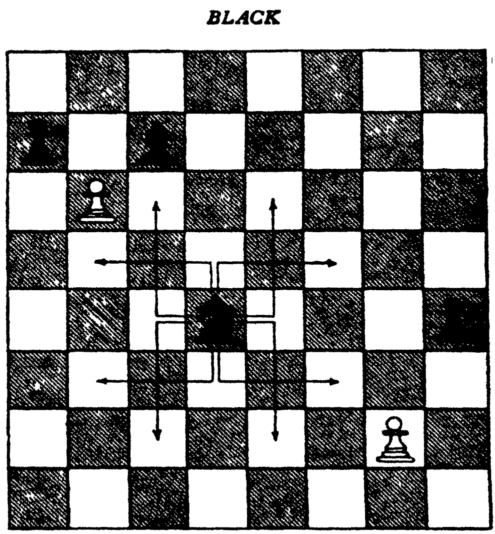


Fig. 3.—Knight's and Pawn's moves

The *Knight's* move is shown in fig. 3. It is an angular move, being one square to right or left, straight forward or straight back, followed by two squares at right angles to the first direction. He may jump over intervening pieces of either colour; but, like every other unit in chess, he only captures a piece by occupying its square. The Knight is the weakest of the pieces.

Finally, *Pawns* are the infantry in chess, the common soldiers who can only move straight forward and never back. When first

moved, each Pawn may advance two squares at the player's option; thereafter one square only at a time. Unlike the pieces, Pawns capture an opponent when it is diagonally in front of them; thus, in fig. 3, the White Queen's Knight's Pawn could capture either the Black Pawn or the Black Bishop; or vice versa.

Capture of an opposing piece or Pawn is always optional, and it often requires much judgment to decide whether to capture an opponent or not. Any piece or Pawn can capture any opposing piece or Pawn, whatever its rank, provided, of course, that it can be done legitimately.

Consider fig. 3 again. If White should move his King's Knight's Pawn two places forward, it would pass a square commanded by the Black Pawn; and in that case the latter could, if desired, take the White Pawn *en passant*, i.e. "in passing"; in the notation this would be described as "P × P e.p.". If Black took the Pawn, his Pawn would move to K Kt 6.

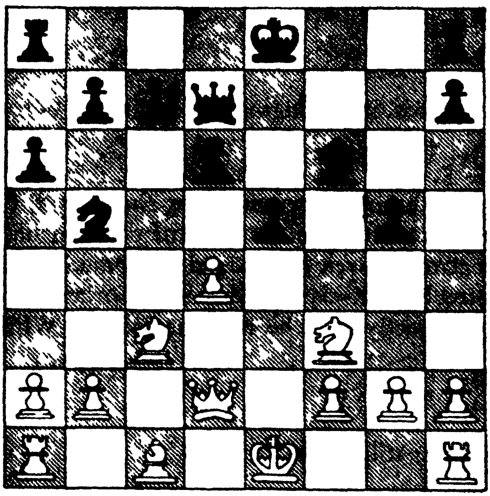
Pawns have one great privilege, which is often the means of winning the game. If a Pawn can reach the top row it is queened, a Queen being substituted for it. Be wary how you sacrifice your Pawns, and where you place them; a Pawn rightly placed in the middle of the game may win it.

When the King is directly attacked, so that he would be captured at the next move if such capture were not averted, the attacking player must call "check". The King then either moves to another square, or he is protected by interposing a piece or by the capture of the rash assailant. Young players usually have a great desire to call check, but beware lest you lose a piece by doing so; the principle of chess is to exchange piece for piece, and a player with one piece down is well on the road to defeat as a rule. It sometimes happens that one player cannot be prevented from checking the King as often as he likes; such a game is "drawn by perpetual check". If a piece is threatening the King, but is masked by another piece which the assailant then moves, the resulting check is called "discovered check". "Stalemate" results when a player cannot move without violating the laws of the game. It commonly arises when the weaker player has only his King left, and the monarch's next move must put him in check. Such a conclusion is a sort of moral victory for the loser, but no great credit to the winner.

Castling may occur when the King and Rook are in the positions shown in fig. 4, provided that neither of them has moved in the

game before. To castle, the White King moves to the Knight's square and the Rook jumps over him to the Bishop's square. If in fig. 4 Black desired to castle, he could do so on either side; and if he castled on the Queen's side his King would still move only two squares, i.e. to Q B square, the Q R moving to the Queen's square. The object of castling is twofold, as a rule, to strengthen one's centre by getting the Rook out of his isolation in the corner, and to protect

BLACK



WHITE

Fig. 4.—Castling

the King behind a number of his own supporters. The King may not castle when in check, nor may he castle into check; and, of course, the spaces between himself and the Rook must be vacant.

To familiarize ourselves with the moves, let us now play over a specimen game, exactly as it was fought between two master players. Watch each move and try to find reasons for it, remembering that in chess no move is ever supposed to be made without reason (although a good many are so made in real games).

WHITE	BLACK
1. P — K 4	. . .

The favourite commencement for an "open" game, since it leads to the freeing of the pieces in the centre of the board.

1. . . . P — K 4

The natural counter.

2. Kt — K B 3 . . .

Attacking the King's Pawn and at the same time opening up his own game. Black now has a considerable variety of satisfactory replies, which lead to different types of games. He selects

2. . . . Kt — Q B 3

protecting the Pawn and bringing out a piece.

3. B — Kt 5 . . .

This constitutes the opening known as *Ruy Lopez*, from a famous Spaniard who invented it in the days of the Armada. It provides White with a strong attack and easy development of his pieces, and is much adopted by first-class players in important matches. Black's Knight being perfectly safe, he therefore attacks White's K P with

3. . . . Kt — B 3
4. P — Q 4

Freeing the centre still more.

4. . . . P × P

This gives Black two Pawns on one file, a position known as a "doubled Pawn", and not desirable because one of the Pawns masks the other.

5. Castles

Getting the Rook into the centre, where he can add his weight to the coming battle.

5. . . . B — K 2
6. P — K 5 Kt — K 5
7. Kt × P Castles
8. R — K sq

Admitted by White to be a mistake. He should have played Kt —

B 5, thereby attacking the Black Bishop and threatening worse things.

8.	...	Kt × Kt
9.	Q × Kt	P — Q 4
10.	P × P *en passant*	Kt × Q P
11.	B — Q 3	B — B 3
12.	Q — Q Kt 4	

Alternatively, the Queen could have moved to K B 4, but this would unnecessarily block his Bishop, a disadvantage. At Q Kt 4 the Queen both attacks the enemy Knight and protects her own King's Rook. This is the sort of move at which you should always aim, to attack at the same time as you protect your own side. If your opponent suddenly produces something unexpected, you are then in the best position to meet it.

12.	...	R — K sq
13.	Q — Q 2	R × R ch

The battle is now in full swing and the slaughter commences.

14.	Q × R	B — B 4
15.	B × B	Kt × B
16.	P — Q B 3	Q — Q 2
17.	Kt — Q 2	...

B — B 4 would have been preferable.

17.	...	R — K sq
18.	Q — B sq	Kt — R 5
19.	Kt — B 4	Kt — P
20.	Kt × Kt	Q — Kt 5 ch
21.	K — R sq	Q — B 6 ch
22.	K — Kt sq	Q — Kt 5 ch

Thus Black draws by "perpetual check". If he plays 22 . . . R — K 5 or R — K 7, White wins with P — K R 3.

You should play over as many games as you can in this way, both as White and Black, trying to see the reason for each move, and particularly noting how an attack is built up. You will soon find that the recognized openings are well known to all good players, so that to be a good player yourself you must know how to counter

them. Some help in this respect is given below. After the opening, however, comes the battle proper, the middle game, and here as a rule you are entirely on your own resources. Finally comes the end game, a very difficult stage, when you either have to force your opponent to his knees (he having most of the board to roam over), or to avoid his forcing you to capitulate. Games and study alone will make you proficient at this; but there are certain principles of the game which help all players who attend to them. These are summarized below.

1. In the opening stages, do not be too anxious to press home an attack, unless you have sufficient forces behind you to see it through; or the counter-thrust may ruin your plans. Attack and the opening out of your own game usually take place together; if properly conducted, your opponent will for a long time be tied to defending himself. A skilful Black player, however, can turn the tables on an inexperienced opponent by a sudden and resolute counter-attack, which leaves White's movements half developed and forces him on to the defensive.

2. In exchanges, White often gives away a Pawn at first, for the sake of the stronger game it gives him; such a sacrifice is known as a "gambit". By skilful play he regains the Pawn later in the game. Try to exchange value for value, i.e. do not sacrifice a Rook in order to capture a Knight.

3. In advancing pieces, make sure that thereby you do not uncover your own defence, so that your opponent by a shrewd thrust may get behind you and massacre your small fry unchecked. Adhere to the principle of mutual support. If you can attack one piece from two quarters it often pays to do so; similarly with a square which you desire to occupy. If such a square is covered by, say, a Bishop, and the Queen of the same colour then occupies it, in some circumstances checkmate may follow almost immediately.

4. If an opposing piece threatens to become a nuisance, drive it away or hem it in. It is often possible so to hem in such a piece as to free a weightier piece of your own for action elsewhere.

5. Always try to get and maintain control of the centre of the board; moves from the flank, though effective at times, are on the whole far less successful.

6. Whenever possible, attack two pieces with one; this frees one of your own for use elsewhere.

7. In the hands of masters, the Pawns frequently decide the

issue. A row of Pawns diagonally across the board is a weak formation, for though apparently protecting each other they are liable to be picked off one by one and broken up. Pawns are best in pairs side by side. On the other hand, the timely advance of a Pawn may completely upset your opponent's game; you will only learn this by experience. In the end game, if you have a Bishop and some Pawns left, aim at keeping them on squares of different colour, so as to give you control of more of the board. Avoid leaving isolated Pawns in unprotected positions.

8. Think not only of your own game, but try to guess what your opponent is up to. If you guess aright (as good generals should), you may be able to lead him on in the belief that he has deceived you, while you yourself unostentatiously prepare a counter-attack elsewhere; then, at the right moment, you unmask your own attack, with devastating results. That is what is meant by chess strategy.

9. Although it is recommended that you should procure such a book as Reuben Fine's *Modern Chess Openings*, and practise from it, mere book knowledge alone will never make you more than a passable chess player. When you feel proficient you should deliberately break away from the book, just to see what happens; remember, *you* are the general, not the textbook moves, and you merely use them when you think that they will help you.

10. Finally, in chess, as in real war, the great dictums of Napoleon (himself a fairly good player) apply. Put the strongest force on the weakest point. Do not attack until you are ready. Never let the other man disconcert you. Catch out your opponent by surprises; surprise is half the battle sometimes. Above all, have in mind your lines of retreat. Just before the famous battle of Marengo, Napoleon dictated four separate lines of retreat in case he lost it; good chess players might well follow his example.

If you have the opportunity of playing with superior chess players, seize it, but do not accept odds unless you feel hopelessly inferior; and don't mind a few beatings. Against a master, however, it is different. The professional chess masters are so competent that they can and frequently do play ten or a dozen games simultaneously; some can even perform this feat blindfolded, walking from board to board and memorizing the positions.

The opening games which follow are a selection from several scores of openings. They are those most frequently encountered to-day, it being assumed that both players make the best moves.

Only the first ten moves of each opening are given, but these are sufficient to show how each game develops. They should be mastered before you try to vary them. (The variations are almost endless; 1215 principal ones are given in *Modern Chess Openings*, besides at least an equal number of minor ones.)

Game No. 1.

	White	Black
1.	P — K 4	P — K 4
2.	Kt — K B 3	Kt — Q B 3
3.	B — Kt 5	

This is the *Ruy Lopez* Opening, which we illustrated in our specimen game. One of the best continuations is as follows:

3.	...	P — Q R 3
4.	B — R 4	Kt — B 3
5.	Castles	B — K 2
6.	R — K sq	P — Q Kt 4
7.	B — Kt 3	P — Q 3
8.	P — B 3	Kt — Q R 4
9.	B — B 2	P — B 4
10.	P — Q 4	Q — B 2
		&c.

Game No. 2.

1.	P — K 4	P — K 4
2.	P — K B 4	P × P
3.	Kt — K B 3	...

This is the *King's Knight's Gambit*; notice that White has temporarily sacrificed a Pawn in order to develop his attack.

3.	...	P — Q 4
4.	P × P	Kt — K B 3
5.	B — Kt 5 ch	P — B 3
6.	P × P	P × P
7.	B — B 4	B — Q 3
8.	Q — K 2 ch	Q — K 2
9.	Q × Q ch	K × Q
10.	P — Q 4	B — K B 4
		&c.

Game No. 3.

1.	P — K 4	P — K 4
2.	Kt — K B 3	Kt — Q B 3
3.	Kt — B 3	Kt — B 3

This comprises the *Four Knights' Game.* It leads to a very even game, as follows:

4.	B — Kt 5	B — Kt 5
5.	Castles	Castles
6.	P — Q 3	B × Kt
7.	P × B	P — Q 3
8.	B — Kt 5	Q — K 2
9.	R — K sq	Kt — Q sq
10.	P — Q 4	B — Kt 5
		&c.

Game No. 4.

1.	P — K 4	P — K 4
2.	Kt — K B 3	Kt — Q B 3
3.	B — B 4	B — B 4

This opening is the *Giuoco Piano*, or Plain Game, a slow but good, safe opening for both sides. One of the many continuations is as follows:

4.	P — B 3	Kt — B 3
5.	P — Q 4	P × P
6.	P × P	B — Kt 5 ch
7.	Kt — B 3	Kt × K P
8.	Castles	B × Kt
9.	P — Q 5	B — B 3
10.	R — K 1	Kt — K 2
		&c.

Note: find how White regains his lost piece.

Game No. 5.

1.	P — K 4	P — K 4
2.	Kt — K B 3	Kt — Q B 3
3.	B — B 4	B — B 4
4.	P — Q Kt 4	

This move comprises the *Evans Gambit*, a variation of Game No. 4, which often leads to exciting struggles. A good continuation is

4.	...	B × P
5.	P — B 3	B — R 4
6.	P — Q 4	P × P
7.	Castles	B — Kt 3
8.	P × P	P — Q 3
9.	Kt — B 3	Kt — R 4
10.	B — K Kt 5	P — K B 3
		&c.

Game No. 6.

If Black prefers not to play the Evans Gambit, he may choose the *Evans Gambit Declined.* Repeat Game 5 to Black's fourth move; then, instead of taking the pawn, he plays

4.	...	B — Kt 3
5.	B — Kt 2	P — Q 3
6.	P — Q R 4	P — Q R 3
7.	P — Kt 5	Kt — R 4
8.	B — K 2	Kt — K B 3
9.	Kt — B 3	B — Kt 5
10.	Kt — Q 5	Kt × Kt
		&c.

Game No. 7.

1.	P — K 4	P — K 4
2.	B — B 4	B — B 4

This is the *Bishop's Game*; it gives possibilities of a good even, open game.

3.	P — Q B 3	P — Q 4
4.	B × P	Kt — K B 3
5.	Q — B 3	Castles
6.	P — K 4	P × P
7.	B — Kt 5	P × P
8.	B × Kt	P — B 7
9.	Kt — Q B 3	Q × Q B
10.	Q × Q	P × Q
		&c.

Game No. 8.

1.	P — K 4	P — K 4
2.	Kt — K B 3	P — Q 3

This is known as *Philidor's Defence* to the King's Knight's Game.

3.	P — Q 4	Kt — K B 3
4.	Kt — B 3	Q Kt — Q 2
5.	B — Q B 4	B — K 2
6.	Castles	Castles
7.	Q — K 2	P — B 3
8.	P — Q R 4	P — K R 3
9.	B — Kt 3	Q — B 2
10.	P — R 3	K — R 2
		&c.

Game No. 9.

A development from the King's Knight's Gambit, which leads to a very strong position for White if properly played, is known as the *Muzio Gambit.*

1.	P — K 4	P — K 4
2.	P — K B 4	P × P
3.	Kt — K B 3	P — K Kt
4.	B — B 4	P — Kt 5
5.	Castles	P × Kt
6.	Q × P	Q — B 3
7.	P — K 5	Q × P
8.	P — Q 3	B — R 3
9.	Kt — B 3	Kt — K 2
10.	B — Q 2	P — Q B 3
		&c.

Game No. 10.—The *English Opening.*

1.	P — Q B 4	P — K 4
2.	Kt — K B 3	Kt — Q B 3
3.	Kt — B 3	Kt -- B 3
4.	P — Q 3	B — Kt 5
5.	B — Q 2	P — Q 4
6.	P × P	Kt × P
7.	P — K Kt 3	Castles
8.	B — Kt 2	Kt — Kt 3
9.	Castles	P — K R 3
10.	R — K sq	Q — K 2
		&c.

Game No. 11.

1.	P — K 4	P — K 4
2.	Kt — K B 3	Kt — Q B 3
3.	P — Q 4	P × P
4.	Kt × P	Kt — B 3

This is known as the *Scotch Game.*

5.	Kt × Kt	Kt P × Kt
6.	B — Q 3	P — Q 4
7.	P × P	P × P
8.	B — Kt 5 ch	B — Q 2
9.	B × B ch	Q × B
10.	Castles	B — K 2

Game No. 12.

1.	P — Q 4	P — Q 4
2.	P — Q B 4	. . .

This game constitutes the *Queen's Gambit.*

2.	. . .	P × P
3.	Kt — K B 3	Kt — K B 3
4.	P — K 3	P — K 3
5.	B × P	P — B 4
6.	Castles	P — Q R 3
7.	Q — K 2	Kt — B 3
8.	R — Q sq	P — Q Kt 4
9.	B — Kt 3	P — B 5
10.	B — B 3	Kt — Q Kt 5

Game No. 13.—The *Queen's Pawn's Game.*

1.	P — Q 4	P — Q 4
2.	Kt — K B 3	Kt — K B 3
3.	P — K 3	P — B 4
4.	P — B 3	P — K 3
5.	Q Kt — Q 2	Kt — B 3
6.	B — Q 3	B — K 2
7.	Castles	Castles
8.	Q — K 2	R — K sq
9.	P × P	B × P
10.	P — K 4	Kt — Q 2

Game No. 14.

1.	P — K 4	P — K 3
2.	P — Q 4	P — Q 4

This game, known as the *French Defence*, is an excellent one for Black.

3.	Kt — Q B 3	Kt — K B 3
4.	B — K Kt 5	P × P
5.	B × Kt	Q × B
6.	Kt × P	Q — Q sq
7.	Kt — K B 3	Kt — Q 2
8.	B — Q 3	B — K 2
9.	Q — K 2	P — Q B 4
10.	P × P	B × P
		&c.

Game No. 15.—The *Sicilian Defence*, another excellent game for Black.

1.	P — K 4	P — Q B 4
2.	Kt — K B 3	Kt — Q B 3
3.	P — Q 4	P × P
4.	Kt × P	Kt — K B 3
5.	Kt — Q B 3	P — Q 3
6.	B — K 2	P — K Kt 3
7.	B — K 3	B — Kt 2
8.	Castles	Castles
9.	P — K R 3	P — Q 4
10.	P × P	Kt × P

If you thoroughly master these fifteen openings and follow up in the middle game with the strategy outlined earlier in these notes, you should play quite a respectable game. You will frequently be called upon, however, to exercise your ingenuity by playing away from the books, either because your opponent suspects that your strong point is not originality or because he himself does not know the openings. Such play can be very disconcerting unless one knows how to deal with it. The proper answer is, do not let your opponent put you off your own plans, but systematically build up your strength in the centre of the board, and then, unless he is very good indeed, he may pay for his temerity. Such games are known as " irregular ". Here, for your practice, is a very fine one, which was played many

years ago between Paul Morphy (Black—one of the greatest chess players who ever lived) and A. Anderssen, a champion too. The notes are also by a chess master (Zukertort).

1.	P — Q R 3	. . .

White abandons the initiative for the advantage of playing the defence with a move in his favour.

1.	. . .	P — K 4
2.	P — Q B 4	Kt — K B 3
3.	Kt — Q B 3	P — Q 4
4.	P × P	Kt × P
5.	P — K 3	B — K 3
6.	Kt — B 3	B — Q 3
7.	B — K 2	Castles
8.	P — Q 4	Kt × Kt

A poor move.

9.	P × Kt	P — K 5
10.	Kt — Q 2	P — K B 4
11.	P — K B 4	P — K Kt 4

Not a good move, because it weakens the King's flank.

12.	B — B 4	B × B
13.	Kt × B	P × P
14.	P × P	Q — K sq
15.	Castles	Q — B 3
16.	Q — Kt 3	Q — Q 4
17.	R — Kt sq	P — Kt 3
18.	Q — R 2	P — B 3
19.	Q — K 2	Kt — Q 2
20.	Kt — K 3	Q — K 3
21.	P — B 4	Kt — B 3
22.	R — Kt 3	K — B 2

Trying to take shelter before the coming storm.

23.	B — Kt 2	Q R — B sq
24.	K — R sq	. . .

Preparing the advance of the Kt P and avoiding at the same time pinning of the Knight.

		R — K Kt sq
25.	P — Q 5	P × P
26.	P × P	Q — Q 2

He dare not take the Pawn.

27.	Kt — B 4	K — K 2
28.	B × Kt ch	K × B
29.	Q — Kt 2 ch	K — B 2
30.	R — R 3	. . .

White here loses the chance to win which Q — Q 4 would have given him.

		R — Kt 2
31.	Q — Q 4	K — Kt sq
32.	R — R 6	B — B sq
33.	P — Q 6	R — B 2
34.	R — R 3	Q — R 5
35.	R — Q B sq	R — B 4

White threatened to advance his Queen over Q 5 to K 6.

36.	R — Kt 3 ch	B — Kt 2
37.	P — R 3	K — R sq
38.	R × B	. . .

A mistake; the correct move was Q — Q 2.

		R × R
39.	R — B 3	P — K 6
40.	R × P	. . .

A blunder; White could draw by Q × P.

	. . .	R × Kt
41.	Q — B 6	. . .

A fatal blunder; Q — K 5 was much better.

	. . .	R — B 8 ch
42.	K — R 2	Q × P ch
	Resigns.	

This game illustrates the peculiar difficulties of the end game, about which we must now say a few words.

Assuming that you are in the better position, you have to force home your advantage as quickly as possible; never slacken off your attention, or your opponent may turn the tables on you. The first thing to do in an end game is to consider the situation of the opposing King. What moves can he make? Aim when possible to restrict those moves. Fig. 5 shows what is meant. Here White has an overwhelming advantage of a Rook to the good; the Pawns balance each

other, and neither can get through without help. To hem in the Black King, White plays R — Kt 7, thus forcing the Black King to remain in the top row; there he must stay until White's King has advanced and mating becomes a certainty.

In other end games Pawns require much protection; when advancing in a King-and-Pawn end game, keep the important Pawn under the wing of and behind your King. It sometimes happens that the advantage lies with the move; if White has it, his King alone

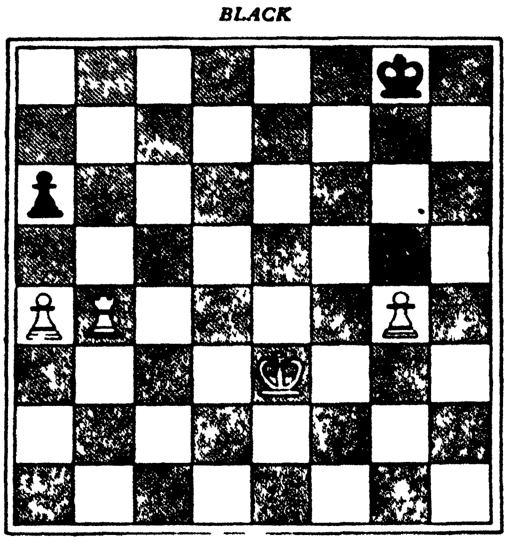


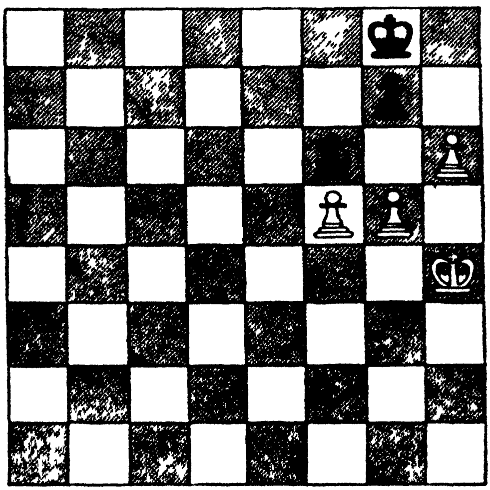
Fig 5 —White to move and win

may drive back the Black King, if Black has it just the reverse applies; therefore count the possible number of moves before you play. If you have a King and two Pawns against one, move the Pawn which has a clear approach, but only under the King's protection. If you are left with a Knight alone, as a rule you cannot force a mate. If your opponent has a Bishop and you have Pawns, keep them on the same colour squares, for obviously this blocks the Bishop's play; for the same reason, keep them off squares of the colour which a Bishop of your own commands. In such a case, if your Bishop is White and the opponent's Black, you are doubling the area over

which you can attack, and possibly reducing to small dimensions the manœuvring ground left to the other side. Above all, play out end games as often as you can, for in the end game you may retrieve errors of earlier play and win what seemed a lost battle. You will derive much help in this from a book by the chess master Capablanca, called *Chess Fundamentals*; it is very largely devoted to the end game.

One often sees chess problems in the daily papers or journals, "White to mate (or it may be Black) in two moves". These are usually ingenious, but they are mere puzzles, positions that rarely arise in real play; and your time will be more profitably employed on real endings. Here, finally, are three good examples of the end game, with their solutions.

BLACK



WHITE

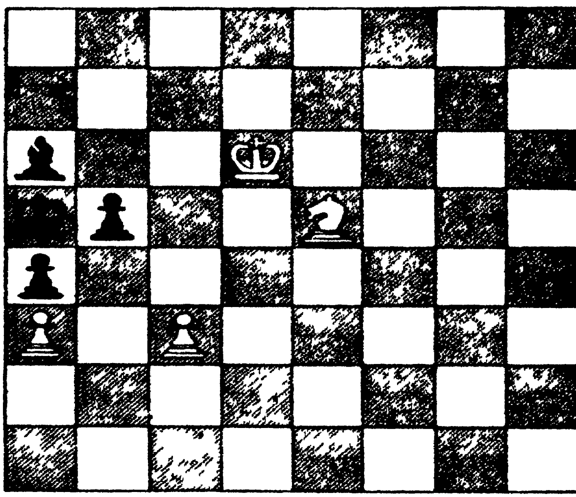
Fig. 6.—White to move and win

End Game No. 1 (fig. 6).—White to move and win.

	WHITE	BLACK
1.	P — Kt 6	P × P
2.	K — Kt 3	K — B sq
3.	K — B 3	K — K sq

4.	K — K 4	K — B sq
5.	K — Q 5	K — K 2
6.	K — B 5	K — K sq
7.	K — Q 6	K — B sq
8.	K — Q 7	K — Kt sq
9.	K — K 7	K — Kt 2
10.	K — K 6	P — R 4
11.	K — Q 5	P — R 5
12.	K — K 4, and wins.	

BLACK



WHITE

Fig 7 —White to move and win

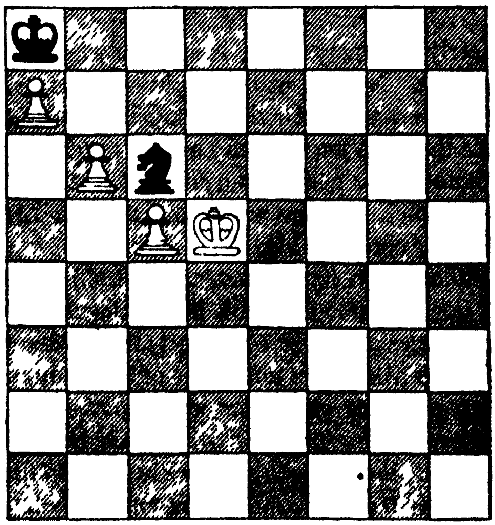
End Game No. 2 (fig. 7).—White to move and win.

1.	K — B 7	P — Kt 5
2.	B × P ch	K — Kt 4
3.	Kt — B 7	K — B 5
4.	Kt — Q 6 ch	K — Kt 6
5.	P — Kt 5	K × P
6.	P × B, and wins.	

End Game No. 3 (fig. 8).—White to win, whichever moves.

1.	P — Q Kt 7 ch	K × Kt P
2.	P Queens ch	K × Q
3.	K × Kt	K moves
4.	K — Q 7	

BLACK



WHITE

Fig 8 —White to win, whichever moves

Or,

1.	. . .	Kt — R 4
2.	K — Q 6	K — Kt 2
3.	K — Q 7	Kt — B 5
4.	P — B 6 ch	K — R sq
5.	P — Kt 7 ch	K × P
6.	R — B 7, and wins.	

One last word on end games. If you show no sign of mastering your opponent, he may demand that you checkmate him within fifty moves; if you fail to do so, the result is a drawn game.

DOGS AND PETS: THEIR CARE AND MANAGEMENT

DOGS

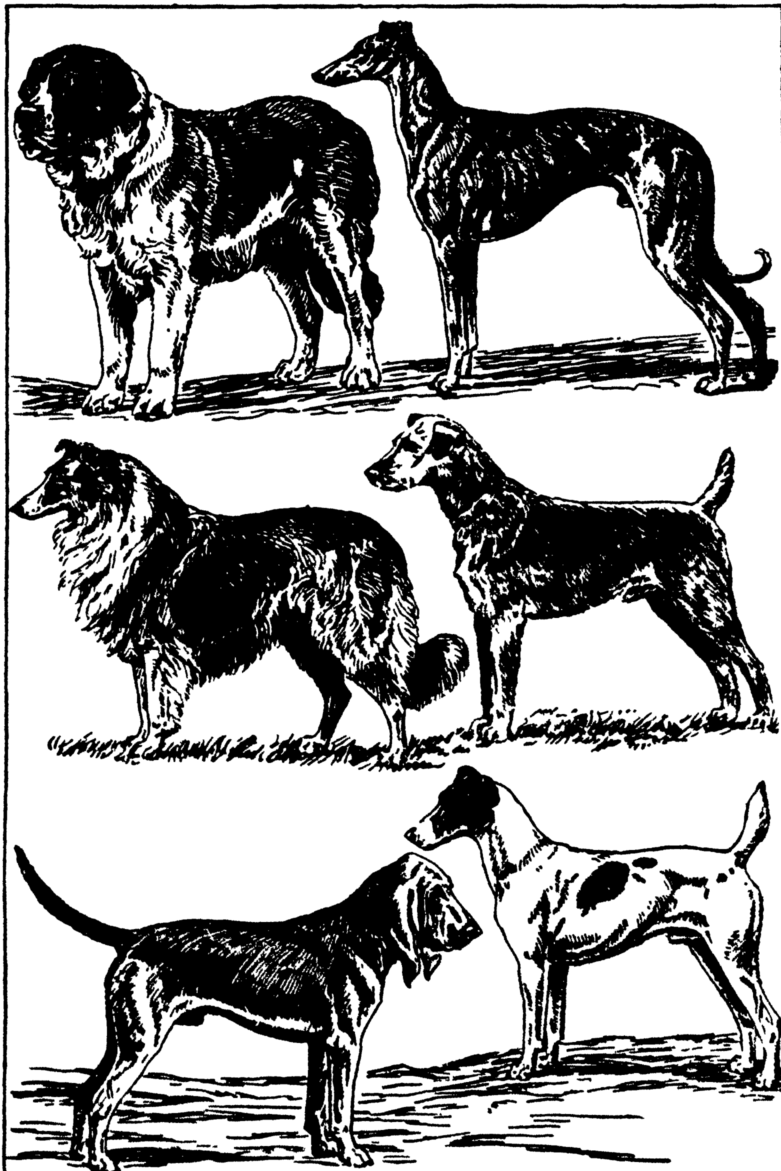
Unfortunately, in many cases, it is quite impossible to buy the dog one likes best. No one who lives in a tenement, for instance, can properly house a Great Dane, borzoi, Irish wolfhound, or even a setter. Thus the question becomes one of purchasing a dog which will fit your home. For general purposes, this may be anything up to an English spaniel, between which and a 2½-lb. Yorkshire terrier your choice is very considerable.

Terriers undoubtedly have the strongest hold on one's affections among small dogs. Though tough little fellows, they can mix in the best doggy circles, and when it comes to guarding your property, even a wee Scottie has a very useful set of teeth and sufficient bark in him to keep prowling characters away at night. Then there is the Cairn terrier, starting-point of the Scotch terriers, shaggy and plucky to the core. West Highland terriers are also nice little chaps to own; the wire-haired and smooth fox terriers hold our affections as tightly as they would a tramp's pants; and if we want a really powerful dog, do not forget the Airedale or the bull terrier.

Cocker spaniels are lovable creatures and full of character. They will jog along at a merry gait for miles behind their master without turning a hair—and who can resist the appeal in their eyes?

Nor should we despise the "drain-pipe dog", the Dachshund, which, despite his ridiculous appearance, is fearless in attack and stout in defence; really a noble little fellow, with a bark several times bigger than his body, and a splendid watch-dog. As his name indicates, he is a sporting dog, a fact which appears to be overlooked by many, being literally a "badger hound".

Buying a pedigree dog is a tricky business. Suppose that you are offered one of a litter of puppies. That little, sad-faced creature which looks at you with pathetic eyes may tear at your heart-strings, but turn your head aside; for you do not want sad faces, nor an animal whose eyes, nose and ears discharge, nor a puppy with bare



BREEDS OF DOGS

St. Bernard — Greyhound
Collie — Airedale
Bloodhound — Fox terrier

patches on its body, however good its pedigree. Rather select the little chap which toddles about and barks cheekily at you, and is ready to bite your fingers. Feeding your puppy is also a problem. Find out what the breeder has been giving it, and carry on in the same way. A puppy whose age can be counted in weeks requires five meals per day. Roughly, the idea is to feed little and often; but as the dog gets older reduce the number of meals and increase the quantity, until the mature dog is having two meals per day. I will come back to this question of feeding later on.

When you buy a puppy you buy trouble, but be tolerant at first. It is quite impossible for him to be clean until he has learned how, and it is sheer stupidity on anyone's part to expect a puppy to have good manners. Give him a comfortable bed, free from draught and damp. When he has been unclean, rebuke him. After each meal, put him out. If he behaves well, praise him. All dogs are extremely sensitive to our tones and soon learn to distinguish when we are pleased or angry; as a rule, they can be taught without thrashing. If you thrash a puppy severely, you will soon thrash all the spirit out of him, confuse his mind, and make both him and yourself very unhappy. Watch your dog. He soon learns to remember, and even when he cannot help misbehaving, is conscious of his fault.

You may desire to have a dog which can compete at shows. If so, you should either be accompanied by someone who is " doggy-minded " when making your purchase, or you should visit several shows beforehand, so as to learn by inspection the principal points of the breed that you have in mind. Whatever the type chosen, when buying, always look for a dog which is not rickety, pot-bellied or spotty-bodied. Look at his mouth. If the upper dentures come too far forward, and the canine teeth do not fit as they should, then he is " overshot ", a bad fault. If the lower line of teeth projects, then he is " undershot ", which is even worse.

Of course, one can only get what one pays for. A two-guinea pup will not set the grass on fire at a dog show. A fair price for a pedigree pup which has a reasonable chance of developing into a prize-winning dog is five guineas; that is, for a dog from six to ten weeks old. This brings me to the question of the age at which the puppy should be when bought. In most cases, it is comparatively safe to take a puppy from its mother at about six weeks, but if possible eight or nine weeks is much better.



BREEDS OF DOGS

Old English sheepdog — Bull terrier
Flat-coated retriever — Foxhound
Setter
Scotch terrier — Labrador

Puppyhood is a hazardous time, particularly during the teething period. From about four months, such things as shoes, legs of chairs or tables, and even carpets, appear very attractive to a playful puppy; really, of course, he desires to ease his mouth, just as a baby does when teething. Give him a bone, and change it for another every three or four days. These bones act on the teeth and gums, allowing the milk teeth to come out, and they assist in cutting the permanent dentures. Bones should be chosen with discrimination. Splintery bones are altogether wrong, particularly rabbit bones, poultry bones, or fish bones. Big juicy shin bones, fresh and clean, are correct for dogs—when one can get them.

Accustoming the puppy to a collar and lead is another troublesome stage in his training. Before your puppy makes his début in public, allow him to walk about the house for a few days with his collar on. Tie a piece of thick string to it. At first there will be a kind of all-in wrestling match; but he will soon get over that. When you do sally forth with him, keep on the move. He may sit down, pull in the opposite direction, or attempt to run round you. Gentle tugs on the lead will invariably keep him on the move, besides teaching him to walk on the proper side. Then he may pull to get in front of you, a common experience. Do not start to walk fast, in order to suit the puppy. Bring him back with " heel ", and keep saying " heel " until he fully understands what you require of him. Of course, if he is particularly dour, pulling him along may result in injury, which should never occur; but even if beaten once or twice, you can master him by patience. Some puppies, as they get on to five or six months, become quite overbearing. Temper on their part must never be overlooked, and if you nip it in the bud you will save yourself a heap of trouble later. An inclination to fight with other dogs in the street must also be discouraged right away; while running and barking at people, or at motor cars, is another undesirable fault.

A folded newspaper makes an excellent correcting weapon. Remember, the quality of obedience must be drummed into your dog. Do not run on to the road after him when he is challenging a Rolls Royce to a race. Keep walking and calling him, and when he does come back, try the folded newspaper and put him on the lead.

Feeding is one of the most important questions in successful dog management. Experienced breeders pay great attention to

feeding, and it is hardly necessary to say that incorrect methods cause more trouble than anything else.

Let us start from the very beginning. When puppies are three weeks old I commence to supplement the mother's rations. A teaspoonful of mince every other day can be tried, and at the fourth week of life keep the mother away for periods. During that time give one of the well-advertised dog milks in a saucer. Soon the puppies will learn to lap, and when they can do this nicely, you can increase the period of the mother's absence. By the time they are six weeks old, they should be independent of her.

Avoid drastic changes of diet in puppy feeding; equally important, never over-feed. Because the puppy eats with avidity, do not say: " Oh, it says so much on the tin, but really he can eat more "; just adhere to what is specified on the tin. One must resist the temptation to yield to a whimper and two pleading eyes . . . and close the door!

After seven weeks or so, when the puppy is eating, say, a tablespoonful of mince, put some breadcrumbs into the milk. Wholemeal bread is all right, nor need you throw crusts away.

At eight or nine weeks comes another important stage—" worming ". Worms and dogs are almost inseparable. Because you do not see them, it does not mean that worms are absent. If you get rid of these internal parasites at the age of nine weeks or so you have done well, and will have set a seal of safety on your dog's life. Once again, stick to the regulations printed on the packet; an overdose of worm medicine can have serious results. There are excellent proprietary medicines on the market for treating worms; but in difficult cases, where a dog is inclined to be constipated, medicinal paraffin for three or four days before worming is advised. A fast of about eighteen hours is essential to the success of worming a dog.

At nine weeks four meals per day are sufficient, but the quantities must now be increased. Introduce such novelties as a little gravy and soup, with which you can give puppy biscuits. Incidentally, if you can induce the puppy to eat these biscuits dry, all the better; an excess of sloppy food is injurious to the health of all dogs. As the weeks go on you can slowly get rid of the patent milk and give cow's milk; with this it is a good idea to add a teaspoonful of lime-water or calcium lactate, both of which are excellent media for making bone, and they are also good for the teeth. For rickety

puppies they are essential. A teaspoonful of cod-liver oil daily is also a great help in rickets. Buy veterinary cod-liver oil; it is much cheaper and lasts a long time. I have found cod-liver oil good for all dogs. Besides the help it gives in bone forming it is a great tonic for the general health, and it goes a long way to promote a good coat.

We come now to the question of meat. " I never give meat," some people say; " it makes the dog savage." This is rubbish. A dog must have meat to be healthy. The question of quantity is determined by the type of dog; but, as a rough rule, he needs half an ounce for each pound of his own weight. Raw meat is better, because cooked meat loses a certain amount of nourishment. Compromise by giving both; in order to break the monotony I would advise breaking away from meat now and again, and giving boned fish for a day or two. Try a herring, from which you have cut off the head and extracted the chief bones, and feed it either cooked or raw. You will be surprised how much your dog will enjoy it.

Fruit and vegetables can also be given to dogs with advantage, either cooked or raw, this depending on individual taste. Potatoes I am opposed to. No matter how fond your dog may be of them, do not give them because they have a definite heating effect, which can lead to eczema. Porridge too should be left out of the menu for the same reason.

If the mature dog has two meals per day, you are pretty safe; nothing between meals! Give the first meal in the late forenoon and the main meal in the evening; both should be followed by an outing.

When you wish to be kind, give him some liver or tripe, while orange juice will be like a cocktail to him.

" How often should I bath my dog?" is a question I have been asked countless times. Many people who show dogs never give them a tub. Soaking in a bath would soon play havoc with the coat of a Scotch or a fox terrier, while a chow's coat would become like that of a Yorkshire terrier if it were over-bathed.

If the animal smells " doggy ", then a bath once a month is advisable, but not more. Just have the water lukewarm, and not deeper than the top of the dog's legs. Wash him over the body first (not forgetting that it has an under-side), and work up to the head. It is quite unnecessary to splash all over his face and frighten him. When you reach the ears work easily and get inside the ears

with the cloth, because if you keep them clean canker is not likely to develop. A most important point about bathing is the soap. Carbolic soap should never be used, nor any strong soda soap. Buy a cake of soap which is intended for dogs and use nothing else. Sheep-dip, lysol, and other strong antiseptics are often advised, but my advice is to leave them severely alone. Old and ailing dogs should never be bathed, nor should a dog be allowed out in wintertime just after a bath.

Old fellows which are faltering in their stride, and dogs recovering from illness, may appear to need a thorough cleanse. Here is what to do. Give them a shampoo. For two shillings you can buy a dog shampoo. For some breeds it will do twice, for others, thrice, all depending on the dog's size and on how you use it.

Dry the dog thoroughly with a dry, coarse towel, and then get the brush or comb on him. Very soon he will learn to love this attention, and will probably leap on to the table when he sees you preparing to attend to his comfort and adornment.

In my experience, grooming is much more important than baths; regular grooming can make baths quite unnecessary. Five minutes daily are quite sufficient; and your dog, instead of looking like the Old Man of the Mountains, or a Polar explorer returning after six months without a shave, becomes a dapper little fellow. A metal comb and a stout brush are all you need. In short-coated breeds the comb is better with close teeth; long-coated dogs require combs with wider teeth. Go over the coat carefully with the comb, behind the ears, in below, and over the tail and back, of course. Then the brush. Get " elbow grease " into it.

Dogs like cocker spaniels can be effectively groomed in parts by the finger and thumb. This may seem crude if you have not tried it, but dull hair behind the ears, or even the feathering on the legs, can be well attended to in this way without causing the dog any discomfort. If you can spend ten minutes on grooming your dog, so much the better.

Terriers require special attention. Is there anything more untidy than a terrier which has been allowed to become scraggy? His coat should be plushed or stripped. You can try your hand with the stripping instrument, which costs only a shilling or so, but it is better to leave this job to a professional. Very often proper stripping makes all the difference between a first prize and a reserve card at a show. Twice a year is quite sufficient for the companion dog

to be stripped, in April and September; but you should carry on with the comb and brush daily at all times.

Sometimes a dog's coat becomes " stary " and its hair falls out. This may be due to several causes. In cases where there is no skin trouble, mix paraffin with olive oil in equal proportions and rub it well into the dog's coat three times a week. It is undoubtedly an effective hair stimulant; but should the dog be suffering from some more serious trouble the first thing is to get rid of this and to build up his system. A sick dog is almost certain to have a poor coat.

In order to keep a dog healthy, exercise is most essential. To open the front door and turn him loose is no exercise; if he comes back in a frightful state, do not scold him but rather blame yourself. The dog which is allowed out to do as he pleases makes more dog haters than anything else. It also causes road accidents, a matter which dog owners of to-day should never forget. Exercise means taking the dog out with you, walking him on hard roads, so as to keep his feet in good order, and then giving him a scamper in a vacant piece of ground. On the other hand, avoid over-exercise, a thing quite likely to happen with puppies. To have him run after your car or bicycle is cruel. Go out in wet weather or dry; but if it be wet, remember to rub him down thoroughly with a coarse towel when you come in. A damp coat can cause chills, colds, bronchitis and rheumatism.

CATS

Although few dog lovers will admit it, there is something very appealing about a cat; on the other hand, cats are never wholly tamed, and self-interest plays a much greater part in their liking for us than in the faithful friendship of our dog.

While most of us may be contented with a cat of low degree and mixed origin, many people now want a pedigree cat, a Siamese, Persian or Manx. Cats are such independent creatures, and will forage for themselves when other domestic pets are demanding one's attention in no uncertain manner, that I think we take the cat too much for granted; but a country without cats would be unbearable. It is too terrifying to contemplate what would become of us if the rat and mice population were allowed to multiply uncontrolled by the cat.

There is a sad lack of knowledge on cat management; I refer of

course to the usual nondescript " tabby ", for I know the great care and attention which are justifiably lavished on show cats. Feeding the cat requires careful attention. Puppy biscuits broken up in milk make a pleasant meal, while fish is always acceptable. Cats vary very much, however, acquire special tastes or " fads " in food, and will starve for days rather than eat anything to which they object, even though it be good for them. A cat, like a dog, needs meat, but not too much; and milk and cats are always associated in our minds. A dish of clean water should also be at hand, and should be renewed twice or thrice each day.



A dish of clean water should always be at hand

A cat's coat should be brushed regularly, as it is essential to the pet's health, as well as enhancing its beauty; never use a comb, as it spoils the coat. By neglecting to brush a cat regularly, you are exposing it to the risk of a nasty complaint, known as fur-balling or balling-up. You have all seen a cat lick its coat. At the moulting period there is a lot of loose hair about, and the cat licks this up. Literally a ball of fur enters the cat's stomach, and unless the cat is sick illness may follow. But prevention being better than cure, groom your cat regularly and keep fur-balling away.

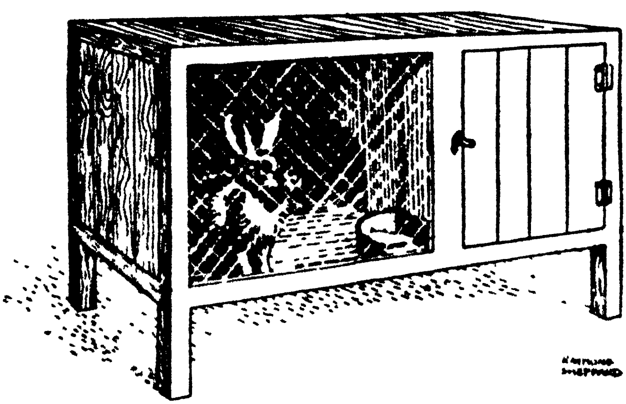
Cats are just as liable to worms as dogs, and the best advice I can give is to purchase one of the well-known proprietary medicines from the chemist's or pet shop. Always give medicines to animals in strict accordance with the instructions on the packet. One must,

for instance, be very careful about dosing a kitten for worms. An overdose can easily kill a kitten, so it might be wise with a very young kitten to treat it first of all with liquid paraffin.

How often should we feed a cat? An adult cat—one over nine months—should do well on three meals per day. A kitten needs more meals than two each day, but of course the quantity must not be too great, although cats on the whole are not so greedy as dogs, and will often stop feeding when the plate is still half-filled.

RABBITS

Housing is your first problem if you desire to keep rabbits. It may be possible to keep them indoors, but most people prefer to have them outside, and I think that is best. I prefer hutches which



are raised from the ground, and which do not face north or east. The size depends of course on the number of rabbits you intend to keep, but a single rabbit should have a floor space at least two feet square. Excellent hutches can be constructed cheaply from the wood of a provision case, or from an orange box, with wire mesh on one side, and a small door cut into the partition to admit to the rabbit's "bedroom".

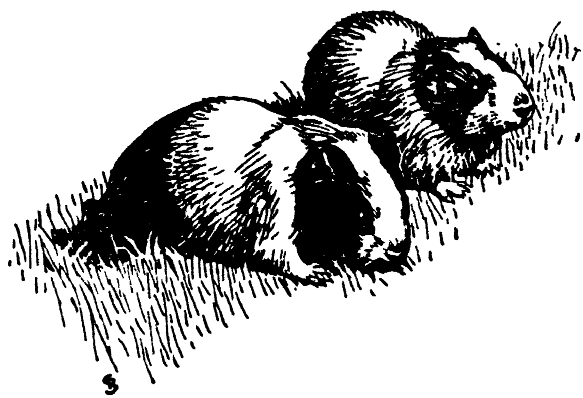
Rabbits will frequently gnaw at the wood of their hutch, especially if a piece is projecting; this annoying habit can be discouraged by occasionally rubbing a paraffined rag over the wood.

In the matter of feeding rabbits, one should aim at variety. Many items of house food are suitable for pet rabbits. Vegetables are always good, as are grass, hay and oats. It is difficult to say just how much food you should provide, because rabbits seem to be happiest when they are nibbling all the time. In a general way, two meals per day are suitable, with something to chew in between.

One of the commonest ailments of rabbits is snuffles. There is a sneezing and coughing, with discharge from the nostrils. You can relieve the rabbit by placing a drop or two of eucalyptus oil and glycerine on the nostrils twice daily. If you have more than one rabbit you should always isolate the invalid in a hutch away from the healthy ones.

GUINEA PIGS

Since the guinea pig was elevated to the dignity of a show animal, it has rejoiced in the name of " cavy ". The cavy section is always an important one at small livestock exhibitions. Guinea pigs are



See how short they can cut the grass

very pleasing and attractive pets, and I have still to hear of one biting a child, or anyone else for that matter. As with rabbits, the question of accommodation depends a great deal on our ingenuity. In a general way, a hutch is built, but avoid draught, cold and damp. I prefer to see all pet animals have adequate space. For three guinea pigs a hutch nearly 3 ft. long should be built, about 18 in.

wide, and say 2 ft. high. Sawdust or peat moss can be used to cover the floor, and this should be changed regularly. Always bear in mind that cleanliness is an essential duty if one intends to keep one's pets healthy.

No doubt you will be anxious to have your guinea pigs outdoors in summer-time. A concrete run is good, but no matter where you put them, be sure that they are not exposed to attack from dogs, cats, or even rats. If you allow them on to the lawn, you will be amused to see how short they can cut your grass; in fact, guinea pigs are quite the perfect mowing machine. The three varieties of guinea pigs are Peruvian, or long-haired, Abyssinian, and English short-haired.

Guinea pigs are among the hardiest of pets, and do not suffer from many ailments. If kept well fed in nice clean hutches, they will live happily for a long time.

CAGE BIRDS. BUDGERIGARS

Many good books have been written about cage birds, which are often the hobby of a lifetime, not merely of boys; adults and children alike take pleasure in keeping and rearing these most attractive and responsive little animals. Shortage of space prevents us from noticing here more than the budgerigar and the canary.

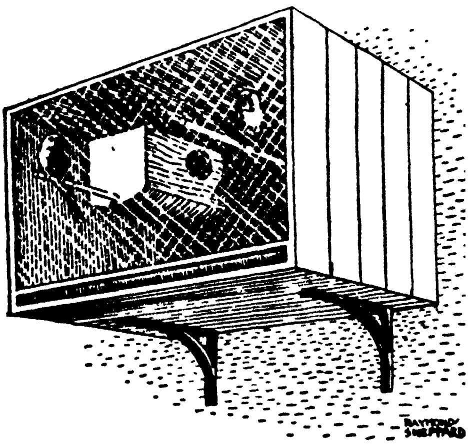
Let me tell you how I bred my first pair of budgerigars from a blue cock and a green hen. My cage, a wooden one, the front only of which was covered with wire, was about 3 ft. long, 2 ft. deep, and 30 in. high. At the top left-hand corner I placed a nesting box. This was of the usual pattern, with concave bottom and a small hole, large enough for the birds to enter, high up in the corner.

No nesting material was provided. Previous experience had taught me that success can only be achieved with cage birds if one keeps them clean, feeds them regularly, and disturbs them as little as possible. Cleanliness is impossible in a cage unless it has an easily sliding tray at the foot, which can be covered with grit.

In due course there was a great deal of coming and going in the nest box. The cere at the base of the hen's upper mandible or beak had become a deep brown and was rough; the cock's was a bright blue. Incidentally, that is how one sexes budgerigars. In a general way, the top of the hen's beak is brown (very pale blue in

a young bird), whereas the same part of a cock bird is always blue.

The hen finally stopped her comings and goings, and spent almost all her time in the nesting box. The cock was most attentive. Immediately her ladyship showed her face at the hole in the nest box, up he would go and feed her, chortling a merry song between times. At this stage one must be less curious than ever. There is naturally a great urge to look inside the box and see how many eggs there are; and although an experienced breeder of birds may do this with impunity, the beginner is advised to curb his curiosity.

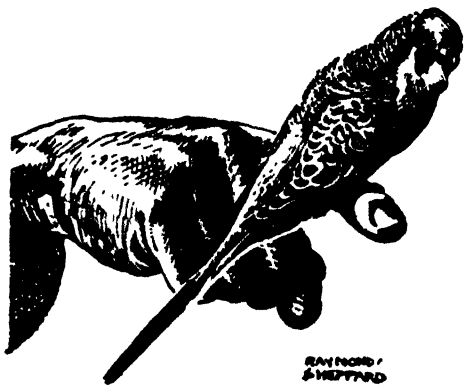


My cage, a wooden one, the front covered with wire, was about 3 ft. long, 2 ft. deep and 2 ft. 6 in. high

There were five eggs in my particular hen's clutch. In due course all hatched out. As one bird was green (a pure colour), and another blue, by what is known as Mendel's law the remaining birds were bound to be all green in appearance; and so they were. I say "in appearance" advisedly, because every one of these green chicks was capable of breeding blue birds. If you mated light greens and blues some of their youngsters would be green, but others blue. This is barely scratching at the great laws of inheritance, but once you have bred birds in this way you will want to proceed much farther, and will learn a great deal about the mysteries of biology by the best of all routes, that of experience.

My first attempt was not the best way of breeding budgerigars. They do much better if there are several pairs. They do not require

to be all in the same compartment, as for the purposes of control one pair to one cage is necessary, but so long as they can see and hear each other they are happier. Budgerigars can be bred all the year round, and are likely to assume domestic responsibilities as soon as they have a nest box; but for maintaining their vigour it is best to confine breeding to the late spring. I need hardly add that there is no more suitable bird for an outside aviary. Hardy in the coldest weather, they can even be kept outside when there is snow on the ground; but in such conditions a comfortable roosting



Teach it to stand on your finger

house is necessary. The aviary should face south or south-west, so that the birds get the maximum of sunshine and are protected in the rear from cold north and east winds.

A note on budgerigars would be quite incomplete were I to omit the subject of the talking bird. While in general it can be agreed that cocks make the better talkers, I have also heard some very fluent and loquacious hens. One sometimes hears people speaking about a bird as " coming from a great talking strain ". Such statements are nonsense. Almost every budgerigar can be taught to talk if one sets about teaching it in the right way. A great deal depends on the age of the bird; the earlier one takes it from its mother the better. A good time to begin is just when it has learned to crack seed for itself. Take the bird away from the sound of other budgerigars and start by winning its confidence. Put your hand in its cage, quietly and without fuss. If the bird dashes about

then leave it, but go back again soon. In a little while you will be able to stroke it lightly. From this stage teach it to stand on your finger.

CANARIES

There are many varieties to choose from among canaries, but I think the beginner would be well advised to stick to the Border Fancy breed until he has gained some experience. Breeding canaries is not so easy as breeding budgerigars, and canaries require more attention. The Border Fancy is probably the hardiest of them, besides being a fine little songster. (Only cock canaries sing.)

The best type of breeding cage is a box, rather smaller than the one advised for budgerigars; I also prefer a cage with a partition, say a sliding wooden one and also a wire one. In the spring, when the cock is in full song and full of vigour, and the hen is fussing about with the small pieces of nesting material that one can buy for her in pet shops, they should be introduced to each other. Previous to this the birds should have been able to see each other through the wire partition. Canaries require a nesting pan, in which the hen will build her nest with the material that you have provided.

When the first egg is laid take it away, and do the same with the first three, keeping them together in a small box—a matchbox will do—but return them at the end of the third day. The reason for this is to ensure that all the chicks hatch on the same day. In about two weeks the young can be expected. You will then require to feed your birds on soft food—grated egg, powdery biscuit food, and the excellent proprietary foods which can be bought at the shop. This must be fed morning and night to the family.

After acquiring some experience, you might want to keep some of the lovely big canaries that may be seen at cage-bird shows. There are Yorkshire, Norwich, Crest, and several others. You might also want to try your hand at blue, white or cinnamon birds, or canaries with pink eyes; but it is best to start at the beginning.

Keeping a cage bird in good condition is something which we all strive to do. Regular feeding, fresh water, and a clean cage are essential conditions for good health. At least once every week the cage bottom should be covered with grit. While grit makes the cleaning of the cage an easy matter it is also essential to the bird's digestion. Cuttlefish bone, too, when obtainable, is also advised. Canaries like their bath, but give it only in the morning. If you

do so in the evening, the canary will go to sleep with damp plumage, and that is very bad for the bird.

A healthy canary is one in tight plumage, and active. When you see him all puffed up (except at night, when he is going to roost) look out for trouble. Get him away from draught and move him into a warm, even temperature. I have found that birds recover their good health through heat sooner than by any other remedy.

You will need to cut a canary's claws periodically. Take the bird in the left hand, its wings to the palm, and with the forefinger and thumb of your left hand hold out the claw which requires to be cut; but before you use the scissors hold the claw up to the light. You will see a thin shadow extending down the claw, and stopping



Showing how to hold canary for cutting claws

just short of its end. You must not cut back to the shadow, as this is a vein; if you do cut it you will cause the bird pain and the claw will bleed.

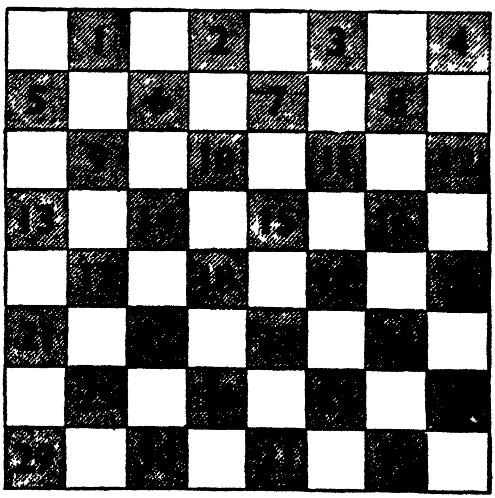
For a bird which seems a bit off colour a course of cod liver is helpful. A drop or two mixed among the seed is the best way of administering the oil. For a bird which seems really ill you may put a drop or two of sherry, whisky, or even brandy in the drinking water. But always remember to give heat.

I might go on to talk about cage birds to the end of the book. The brightly coloured and inquisitive, friendly chaffinch thrives quite well in confinement, and in the spring his song is charming. Other finches of many kinds make good pets; then there is the linnet; and last of all the raucous-voiced but never tedious parrot. The parrot, in particular, may have been a grandfather before you were born, and he may still be going strong after you are dead. But parrots are a study in themselves, the pursuit of which you will have to follow elsewhere.

DRAUGHTS

Draughts, one of the most ancient of table games, is also one of the most universally popular. It is played according to different rules in different countries. The British game, with which alone we are concerned here, requires a board of 64 squares (identical with a chess board). Each player has 12 pieces called " men ". The board is placed so that each player has a black square at his left

BLACK



WHITE

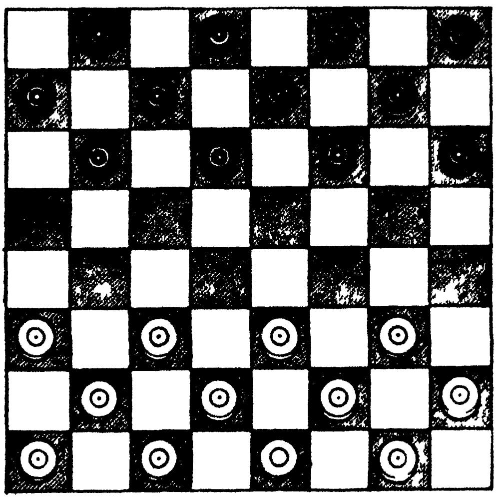
Fig. 1 —Draughts notation

hand and a " double corner " at his right. (In printed diagrams the squares not played upon are often dark, but this is simply in order to show up the pieces better.) For the purpose of recording games, the 32 squares upon which play takes place are numbered 1 to 32 (fig. 1), No. 1 being at Black's right-hand end and No. 32 at White's right-hand end.

The board being set (fig. 2), Black always makes the first move; but the players change colours at each succeeding game. The men can only be moved forwards along the diagonals, one square at a time. They cannot move to any square which is occupied either by one of their own colour or by one of the opponent's.

The object of draughts is to make it impossible for the other side to move, and this is accomplished by capturing his entire

BLACK



WHITE

Fig. 2 —The board

force. To effect a capture there must be a vacant square behind the threatened man; assuming that this is a White man, and that a Black is adjacent to it, the Black man takes it by jumping forwards over it and removing it from the board. If it is possible to take more than one man in this forward jump the player must take it; but he cannot take both forwards and backwards, that privilege being reserved for Kings. The essence of the game, then, is to manœuvre your opponent into such a position that you capture more of his men than he does of yours; and if you thus gain an advantage of one man only you should nearly always be able to win.

When a man reaches the farther edge of the board (squares 29 to 32 for Black, squares 1 to 4 for White), he becomes a King, and is crowned by placing a second man of his own colour on top of him. A King may move and take either backwards or forwards, but only at the same rate as the men, one square at a time.

The moment that an opportunity of capturing a man or men occurs, the player must take it, even if the resulting position is to

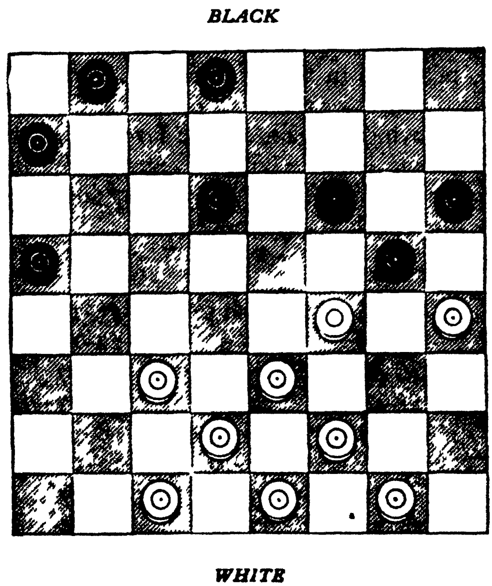


Fig. 3

his disadvantage; hence, it often happens that men are deliberately played forward in order to be taken, with the aim of gaining later. If it occurs that the player can take at two different places, capturing one man at one point and perhaps two or more at the other, he may make whichever move he prefers, but he must take one or the other. Should he neglect or refuse to do so, his opponent may (before playing) claim a " huff ". The opponent may then either remove the offending man from the board, or insist upon its making the capture, or overlook the offence. This decided, he then makes his own move before the player in default moves again.

To illustrate these remarks, let us consider the position shown in fig. 3. Assume that it is White's move. He plays 19–15. Black *must* now capture the man on square 15. He can do so either by playing 10–19 or 11–18; but if he chooses the latter he must continue the take to square 25 and remove the White man from square 22, otherwise a huff will arise. White next moves 20–11 (capturing the man on square 16) or 30–21 (capturing the man on square 25). If he makes any different move he is huffed.

There are numerous well-recognized ways of opening a game of draughts. Unlike the chess openings, these lead to very similar, if not identical, positions in the mid-game; nevertheless, the young player is advised to master the usual openings, that being by far the best way of improving his game. One favourite opening is known as the Single Corner, because both players play out their three men from the single-corner diagonal. Let us play such a game through, remembering that Black always moves first.

The Single Corner Game.

11–15	12–16	9–14	15–18	17–26
22–18	24–20	18–9	22–15	31–22
15–22	10–15	5–14	11–27	10–14
25–18	21–17	23–19	32–23	22–18
8–11	7–10	16–23	8–11	
29–25	17–13	26–19	30–26	
4–8	8–12	3–8	14–17	
25–22	28–24	27–23	26–22	Black wins.

A whole group of openings starts with the following four moves:

11–15, 23–19, 9–14, 22–17.

If the fifth move is 5–9, the opening is called a *Fife*, because it was a favourite with James Wyllie, a Scottish champion from that county.

If the fifth move be 6–9, the game is a *Souter*, so called in honour of an old Paisley shoemaker.

Should the fifth move be 7–11 a *Whilter* game results, from a Scottish word which means confusion.

As with chess, the best way to learn is to play good games through, endeavouring all the time to see what each player had in mind; it is much easier to do than in chess, there being far less to think about, but nevertheless the reasons for moves are often far from

obvious at first. Each game should be played through at least twice, so that you see the board both from Black's point of view and from White's. Examples of the above three games follow; we will comment on draughts strategy later.

The Fife Game.

11-15	30-26	11-16	32-23	10-14
23-19	11-16	25-22	8-24	17-10
9-14	26-22	3-8	28-19	6-24
22-17	16-20	23-18	4-8	13-6
5-9	17-13	14-23	29-25	2-9
26-23	8-11	27-11	16-20	
7-11	22-17	20-27	23-18	Black wins.

The Souter Game.

11-15	22-17	11-15	17-10	12-19
23-19	14-18	32-28	6-15	9-6
9-14	24-20	15-24	23-5	1-10
22-17	15-24	28-19	19-24	5-1
6-9	28-19	4-8	13-9	19-24
17-13	9-14	30-26	24-28	
2-6	29-25	8-11	27-23	
25-22	5-9	19-15	15-19	
8-11	26-23	10-19	23-16	Drawn.

The Whilter Game.

11-15	19-16	1-6	12-8	26-30
23-19	12-19	28-24	10-15	22-17
9 14	31-26	15-18	8-3	28-32
22 17	30-23	22-15	11-16	17-14
7-11	27-2	10-28	3-7	20-24
25-22	20-27	17-14	15-19	14-10
11-16	32-16	4-8	7-11	24-27
26-23	6-9	29-25	16-20	23-18
16-20	16-12	8-11	11-16	27-31
30-26	8-11	25-22	19-23	10-7
2-7	2-6	6-10	16-19	30-26
23-18	11-15	14-7	23-26	18-22
14-30	6-13	3-10	19-23	26-17
				Drawn.

Three other very useful openings commence with the following four moves:

11–15, 23–19, 8–11, 22–17.

If the fifth move is 9–13, the game becomes a *Laird and Lady*, a name which it owes to Laird and Lady Cambusnethan, with whom this opening was a favourite.

If the fifth move is 11–16 a *Glasgow* game results. (The strong Scottish bias of these various names shows how great is the influence of draughts north of the Border.)

If, on the other hand, the fifth move be 4–8, the game is known as *The Old Fourteenth*, it being the fourteenth game in Sturges' original (1800) *Guide to the Game of Draughts.*

Examples of each game follow.

The Laird and Lady Game.

11–15	25–21	11–15	23–19	14–18
23–19	2–6	3–7	15–24	16–12
8–11	30–25	22–26	28–19	9–14
22–17	17–22	31–22	22–18	12–18
9–13	21–17	18–25	7–3	18–22
17–14	6–9	19–22	18–14	8–4
10–17	24–20	6–10	3–7	14–18
21–14	1–6	7–14	13–17	7–11
15–18	32–28	9–25	19–16	18–23
26–23	12–16	17–14	17–22	3–8
13–17	19–12	30–26	16–12	23–27
19–15	7–10	14–10	22–25	11–16
4–8	14–7	26–22	20–16	27–32
24–19	3–26	27–23	25–30	8–12
6–9	12–3	25–30	12–8	32–27
28–24	26–30	10–7	5–9	4–8
9–13	25–21	30–26	8–3	Drawn.

The Glasgow Game.

11–15	3–7	15–24	15–19	
23–19	28–24	28–19	31–26	21–17
8–11	7–16	5–9	19–24	30–26
22–17	24–19	17–13	26–22	17–13
9–14	16–23	10–15	24–27	26–23
25–22	26–19	19–10	22–18	14–9
11–16	4–8	6–15	16–19	23–19
24–20	30–26	13–9	23–16	16–12
16–23	8–11	1–10	14–23	
27–11	26–23	22–17	17–14	
7–16	11–15	12–16	10–17	
20–11	32–28	29–25	21–14	Drawn.

The Old Fourteenth Game.

11–15	11–15	2–9	12–19	12–19
23–19	28–24	26–22	23–16	22–8
8–11	8–11	1–6	13–17	14–17
22–17	26–23	32–28	22–13	21–14
4–8	9–14	3–8	8–12	10–17
17–13	31–26	30–26	24–19	
15–18	6–9	9–13	15–31	
24–2c	13–6	19–16	26–22	Drawn.

A variation of the Laird and Lady game is known as the *Black Doctor*; here is a specimen:

11–15	19–10	4–8	28–19	8–11
23–19	7–14	32–27	6–10	16–12
8–11	25–22	1–6	27–23	2–6
22–17	3–7	29–25	11–15	12–8
9–13	27–23	10–15	19–16	15–18
17–14	6–10	23–19	12–19	22–15
10–17	24–20	15–24	23–16	11–18
				Black wins.

Should the second player make his first move across the direction of his opponent's 11–15, i.e. should he play 23–18, a *Cross* game ensues. The first few moves of this are as follows:

11–15, 23–18, 8–11, 24–19, 15–24, 28–19, 11–16, 26–23, 4–8, &c.

Another opening, the *Ayrshire Lassie*, results from playing 11-15, 24-20, 8-11, 28-24. Yet another, known as *The Dyke*, opens with 11-15, 22-17, 15-19.

Between good players games of draughts more often than not result in a draw, for there are almost infinite ways of obtaining a draw by careful play. On the other hand, novices often abandon as a draw a game which experts would force to a conclusion. (By

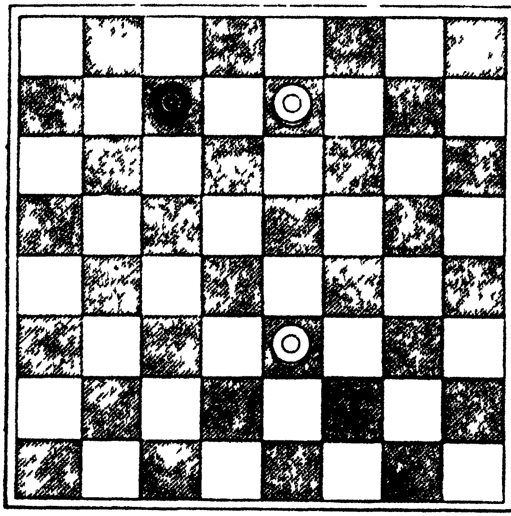


Fig 4—Two kings against one

the way, if you cannot show a decided advantage, your opponent may demand that you win within forty of your own moves; failure to do so results in a draw.) The familiar instance of two Kings against one is a case in point. Let us place the two White Kings anywhere we please, and put the one Black King near a double corner (fig. 4). If properly played, White must win, and quickly. The principle is to drive Black out of the double corner without allowing him to reach the opposite double corner. This is how the case in fig. 4 is solved.

It does not matter which player moves first, but we will assume that Black does so.

6–9	5–9	5–1	5–9	13–17
7–10	18–15	15–10	1–5	15–18
9–5	9–5	1–5	9–13	17–13
23–18	10–6	6–1	10–15	18–22

and Black has only one more move.

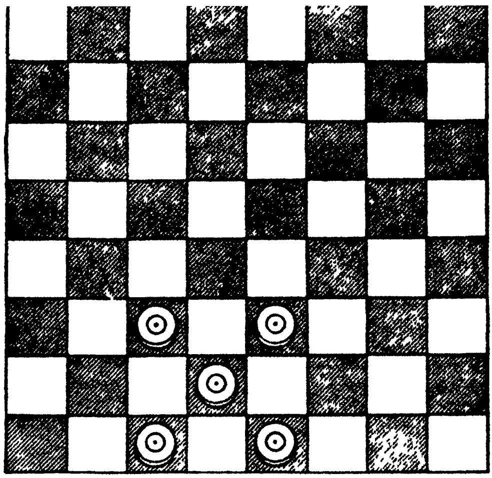
Three Kings against two is also often assumed to be a draw, if each of the two Kings occupies a double corner; but this is not so. The principle is quite simple. You first station one of your men sufficiently near a double corner to pin down one of your opponents to the corner and one escape route, and then, with the other two Kings, drive him out of the opposite corner. Keep all three Kings on one diagonal. If this fails, wherever the Kings may be placed, sooner or later you can force a take, one-for-one; the position of two Kings against one then arises.

Inexpert players at draughts are loath, as a rule, to move the men out of their back row, being convinced that if they do so they will make it easier for the other side to get a King. This is another fallacy. We have seen how readily good players clear the whole file out of the single corner; and in many games you can just as safely play the second man from the " double corner " end of the board, because the second and fourth men (squares 32 and 30 for White, 3 and 1 for Black) are usually a good protection to the next row.

In draughts strategy, as in chess, when you attack do so with all the weight that you can bring to bear, but that does not necessarily mean using many pieces. To play towards the centre is excellent policy on the whole; but it is quite easy to make a strong game from the sides, because the side permits you to take with safety when you have only two men. The principle of backing up one's attack is well shown by the following diagram (fig. 5). Only White men are shown. It will be noticed that the " star " formation not only gives White two attacking columns of three, but also adequately protects his two outside men; for if the positions of the men not shown in the drawing permits Black to take two for one, a man in White's back row at once regains the man. When you are in doubt what to do in an intricate game, therefore, you may do worse sometimes than complete such a " star ", always bearing in mind that the back of the cross (unless it is at the edge of the board) needs protection just as much as the front. To improve your

game, too, you should get into the habit of laying traps for your opponent; and if he will not move into the desired square, consider how you can get him there by temporarily sacrificing one of your own men. A three-for-two take may not only win the game, but sometimes it has a demoralizing effect on your opponent which is just as effective. Above all, when laying your own traps look out

BLACK



WHITE

Fig. 5

for those of the other side; and do not make moves rapidly and without thought, just because your opponent is a quick player; for even among good players that is liable to end in disaster.

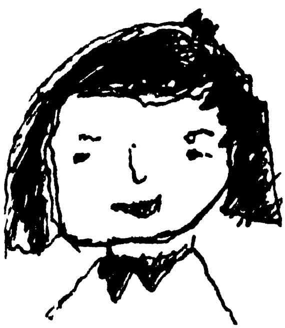
You must not touch a man unless you intend to move him, otherwise your opponent may compel you to do so; moreover, never take a move back even if your opponent is willing to agree.

One last word on draughts. Moves which seem obviously silly or unnecessary to spectators are often made by both sides, and it is hard to check one's natural desire to advise; but never do so. Let the stern motto of the old Romans be yours, *Tace*!

DRAWING, WATER-COLOUR PAINTING, ETCHING

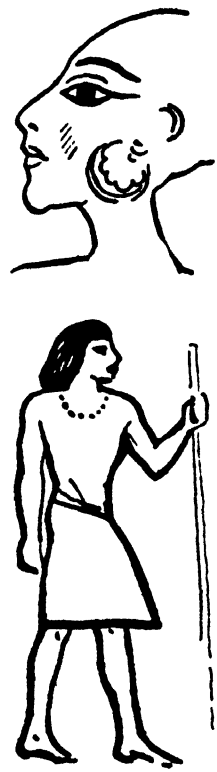
DRAWING

When one comes to think of it, drawing in line is a curious convention. Lines, it is said, do not exist in nature. Every object seen is visible as areas of light and shade, contrasted with a lighter or darker background. But one must accept the line idea; it is almost instinctive to run a line round the form. There is a world of difference, however, in the manifold ways in which this may be done. When a young child draws a head, it is not visualizing the head so much as cataloguing it, and "entering" symbols for the various parts which the child knows are "neces-



Child's drawing

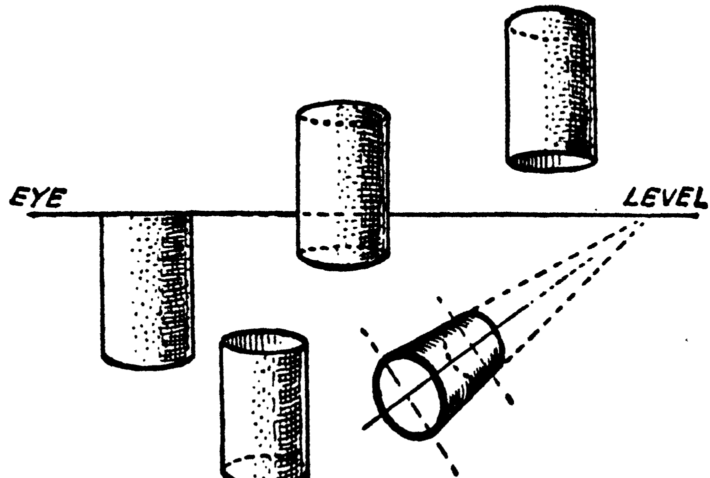
Drawing necessitates seeing intelligently, and the representational drawing which "goes wrong" does so through wrong thinking, for wrong thinking makes untrue seeing. Mankind has been learning to see in this way for thousands of years, and as his knowledge accumulated, so did his power to represent nature—seen in three dimensions — upon a plane surface of two dimensions.



Egyptian art

In ancient Egypt, sculpture in the round attained quite a high level of accuracy to nature's forms, sometimes even a very high level indeed, in some portrait sculpture; but in the mural paintings and sculpture in low relief, the figures present such anomalies as the

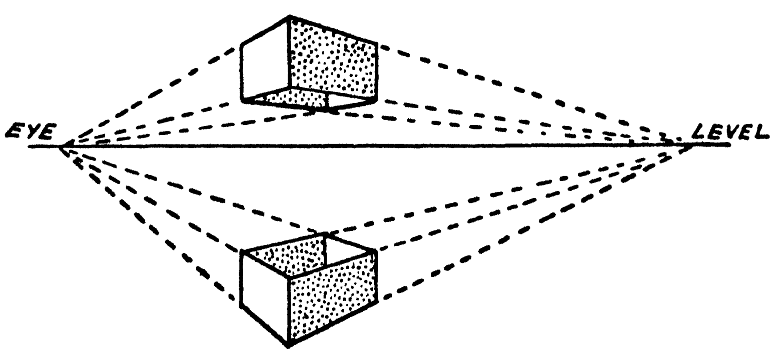
eye-form of the front view imposed upon a head in profile, and the bodies swung round from the hips in the familiar Egyptian convention. Apparently the Egyptian was satisfied with this. Knowledge



The cylinder

of perspective and foreshortening was yet to come, so the problems were not yet apparent, or were evaded as impracticable.

We have no such limitation of knowledge; it is all available to

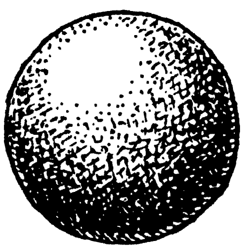


Perspective—the box

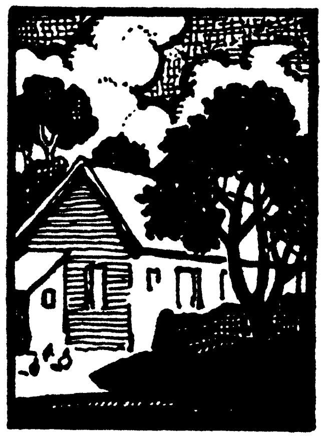
us. The highest precision of representation on the flat is possible with study and practice.

The fundamental forms in nature which must first be thoroughly understood are the cylinder, the cube, and the sphere. The cylinder gives us the difficult and ever-recurring ellipse-form, opening more and more as it rises above or sinks below the eye-levél. The cube contains the mysteries of linear perspective, and the sphere presents the problems of light and the tones of shadow that render " roundness ".

These fundamentals may be rather quickly passed over in this article, as the reader is likely to have some knowledge of them already, but the importance of practice with these forms cannot be exaggerated. They should be used in imaginative drawings constantly, as the basis of the forms of houses, carts, fences, haystacks, tree-stumps, roads, tunnel-openings, or what you will, until these fall into their relationship with each other in a convincing manner, by knowledge and intelligent observation.



Light and shade—roundness



Drawing in mass and " shapes left "

After this foundation, the mind must be trained to draw from nature with a broader way of seeing—studying the relation in size and position of the main shapes in view, the arrangement that makes the drawing true. There are only general rules for this—every acute mind will find a different plan of campaign, for that is what it is, for each problem. Some key-shape will be found, and from it the solution of the next. It is well to point out the value of the " shapes left ", as these are of great assistance. It is practically impossible to draw a hand with extended fingers, for instance, unless the shapes between the fingers are as carefully observed as the fingers themselves. The shape between two objects gives the outlines of part of

both. Tree-forms studied by the shapes left between the branches are rendered with comparative ease.

If the student could truly draw the forms of the objects and the shapes between them, all would be well—his troubles would be over; but it takes a great deal of practice to attain this quick reduction of three-dimensional nature to a two-dimensional drawing. One of the methods of plotting-in the main proportions of a drawing is by checking it with what we may call the " levels and perpendiculars " method. We have one point, we select another to be drawn—we must find our way to it by thinking of a line straight down from the first, or along from it on a level line, and then so much at right angles. Find out where each point would cut the neighbouring form, if produced horizontally or vertically. We must find our way about the drawing by reason and initiative, not by guess.

Another thing to be noted is a quotation from a certain art teacher, who said: " If you can't count them, don't put them in " —referring to leaves and grass, figures in a dense crowd, and so on; they must be " put in " with regard to their appearance in the mass effect.

The kind of line used must be considered. The stiff movements of writing must be forgotten. The hands are not sufficient to control the pencil—the whole arm must be free, and the movements flowing. A pencil is capable of an ugly line or a beautiful one. The quality it produces belongs to the student and to his idea of beauty. Cleanliness is usually to be fostered, a light touch can at least be altered successfully, though a bold attack by a sure hand is perhaps the ideal before us. A wise draughtsman will draw very warily at first; he is aware of the pitfalls before him, and the careful thought and the concentration he must bring to the problems, and he will put his stronger accents in when he knows that he has brought his campaign within sight of victory.

Books suggested:

Drawing, Design and Craft-work. Frederick J. Glass. (Batsford.)

Drawing. Harold Speed. (Seeley, Service & Co.)

PAINTING IN WATER-COLOUR

The first consideration is the paper on which the painting is to be done. To those who have never painted on a stretched paper, this level surface which will not bulge or " cockle " brings new encouragement and hope.

Although there is a great variety of surfaces to exploit later, a medium-grained hand-made water-colour paper, with what is called a " Not " surface, should be used at first. The sheet is cut somewhat bigger than the required painting—about 2 inches each way being allowed for the pasted edges—and is put into a bath of water for about five minutes. It is then placed face down on a towel and the edges dried all round with the same or another towel, but the centre area left very moist. A line of vegetable glue or other adhesive is applied, about half an inch wide all round the edges, and the sheet is then reversed on to its drawing-board, and stuck down. Again the edges are dried by dabbing with the towel, leaving the centre alone. In this way the edges will dry first, and when the contraction takes place in the centre, the edges are ready to take it without slipping. The paper may, of course, be brought over the edges of a board, the corners suitably cut, and the overlap pasted down at the back of the board.

The drawing must be done either before stretching, or after the paper is thoroughly dry, and stretched firmly.

The colours should be as good in quality as possible, and there should not be too many of them, especially at first. It is better to discover the possibilities of a few when exploited thoroughly, than to trust to made-up mixtures which will tempt the student to garishness and vulgarity of colour.

The secret of painting lies in the control of the grey qualities—what looks very green in nature is probably, on keen observation, perceived to verge slightly towards grey—perhaps a bluish, perhaps a yellowish grey, and so on. Nor is it easy to conquer the superficial assessment of colour values.

The colours suggested for a beginner in the excellent book on *Watercolour Painting* by Mr. Alfred Rich (Seeley, Service & Co.) are light red, yellow ochre, cyanine blue, ivory black and burnt sienna. Cyanine blue is used in preference to Prussian blue, which is not a permanent pigment. This is an interesting list, and crimson

is cut out to encourage the mixing of quieter purples than would perhaps be used otherwise. The yellow ochre and blue will give soft greens, and the light red, blue and yellow together, a whole series of beautiful greys. Mr. Rich advises the use of ivory black, and suggests that the student should experiment with ivory black in all its tones, and then in combination with each of the other four colours separately.

The student should endeavour not to be quickly tempted to add to the restricted list, but to try to appreciate the greyish beauties that the intermixture of these few should produce. Gradually brighter colours may be added—ultramarine, viridian, raw sienna, aureolin (a clean bright yellow, to be used sparingly), vermilion, crimson lake, or better still, rose madder, and emerald green—the last a colour which cannot be obtained by mixture of blue and yellow, but which should only be used in pure washes, unmixed with other colours.

The manner in which the colour is applied to the paper is of the greatest importance, and must be the outcome of painstaking experiment and personal experience, but it is desirable to know some general rules that painters of experience have learned to follow in their search for beauty in this medium. The most inflexible of these is that the beauty of water-colour is the transparency of the method. The paper must be allowed to shine through the paint; even in the darkest passages there should be a feeling of transparency, however slight. Not only is transparency essential, but this quality is marred by painting several times over on the same area, even when each wash is thoroughly transparent, and even when each wash is correctly applied on a thoroughly dry surface each time. Disaster, of course, is certain if the next wash follows before the last is properly dry. So that the paint will have beauty and glow, the colour of each area must be prepared, the tone of the colour carefully adjusted, and then the colour must be floated on with a big, full brush, taking care not to touch the paper but once in every part, if possible, and then the wash must be left alone, for better or for worse, to dry, except for the removal of the excess at the bottom of the area.

In times past much was made of the method of keeping the paper moist throughout the painting, even to the extent of using such a stretcher as would allow wet cloths to be inserted behind the paper, and such a method may be correct enough in the painting of a misty seascape, or similar subject, but in general the paint should

be applied to dry paper, and each area of tone applied on the principle of a series of blots, large and small, which have been allowed to dry without interference.

If the true tone and colour are struck in one painting, the result will have beauty. If certain areas need two paintings, the colour may still be beautiful in surface, but each correction is a danger, and eventually, repeated alteration will dispel the charm of the medium. Because of this, a painting in water-colour must be planned beforehand, not only in composition, and the essentials sought out, but planned in method in advance as well. This done, the execution must be swift, for water-colour is a " shorthand " method of painting, at its best.

To make clear that no method is or can be altogether adequate, we may consider the painting of skies, where an exception to the " dried blot " ideal may readily be found, and where foresight, ingenuity and speed are urgently called for. On a summer day, the blue sky will be rapidly painted from the more intense blue in the upper part, changing to the lighter, greener blue nearer the horizon, in a graduated wash. The shadowed sides of the large clouds which may be necessary to the composition are observed to merge slightly into the blue, while the upper edges are sharply defined. The painter will rapidly float in the greys of the shadows and reflections on the clouds while the blue wash is still wet, and so obtain the softened contour he requires. Now the whole sky is wet together except the brightly lit parts of the clouds, which will be left sharply dry against the blue.

Each painter in water-colour may find his own methods in infinite variety. Some painters get certain effects by exaggerating the colour considerably and then reducing the tone by sponging the over-brilliant colour, and even brushing with the finger-tips in one direction very lightly on the wet surface, making the grain of the paper emerge through the wash, obtaining a mottled tranparency of considerable beauty, but this is not our system of the dried blot, nor is it getting the colour and the tone down at once and untroubled.

Book suggested:

Watercolour Painting. Alfred Rich. (Seeley, Service & Co.)

ETCHING

The name of Etching has been given to a peculiarly fascinating art—a compound of drawing and chemistry, wholly engrossing, whereby prints are made from inked lines inscribed by acid action upon the surface of a metal plate. The word " etching " comes from the Dutch *etzen*, to eat, and etching is an eating-away process.

The first requirement is an etching-plate of suitable material—copper or zinc—its surface absolutely smooth and free from dirt and scratches. The plate obtained, its surface is further cleaned and polished with Brasso, or some such metal polish. The next step is to obtain a " ground ", which when spread thinly on the metal will defy the acid which we are going to use to do the biting for us. This substance is usually composed of two parts of white wax to one part of gum mastic, the wax melted first and the ground gum added little by little. It is readily obtainable made ready for use, as a wax-resinous ball known as Etching Ground. The clean and polished plate is heated on an iron stand or " hot-plate " over a gas-jet, and when the ball of ground will melt readily on trial at the edge of the plate, it is passed over the surface quickly and sparingly. A ball of cotton wool, wrapped in kid or silk, is dabbed over the plate, spreading and thinning the wax. The ground should be bright when the plate is cold. If not, it may be reheated and some more of the ground removed, as dullness is an indication that the deposit is too thickly laid.

When the process of grounding the plate has been successfully completed, the back of the plate must be protected also from the acid; the best and cheapest way to do this is to paint this area with Jet Glaze stove polish, or straw-hat varnish, or a mixture of equal parts of shellac and methylated spirit.

When this coating is dry we come to the stage of making the drawing upon the plate, and for this we need an etching needle, and an excellent one may be made in a few minutes by jamming a new gramophone needle into a wooden handle, and perhaps reinforcing it with sealing wax. It is presumed that the etcher has a drawing ready to transfer to his plate. This drawing is now traced on tracing paper, and it must be noted at this point that the *print* from the plate will be the reverse of the *drawing* we put upon the plate. The tracing should be concerned with the main lines of the

design only. Having considered this point, one side or the other of the tracing becomes the " back " of the drawing, and this side is rubbed evenly with white chalk, the excess dusted off carefully. Putting the chalk side down on the grounded side of the plate, the needle is drawn over the lines *very*, *very* lightly, hardly marking the paper, and the drawing will be found transferred in exceedingly fine chalk lines upon the wax ground. It will not easily come off, even in the acid bath.

The needle is now used to cut through the ground. This will be found to be a free, velvety action; it is not necessary to do more than lay the metal bare with the needle point. The success of the etching depends now upon the way in which this is done—the surfaces are treated in various ways to give the differing textures desired, and the needle will render these according to the invention and experience of the etcher. At this stage the design is seen in negative form, its lines showing up brightly against a darker background.

Now, if the whole work were finished in this manner, with all its texture and shading, and the plate " bitten " in the acid-bath correctly, an etching would be produced, but one with every line almost the same in width and strength. This might be very successful, but as a rule it is desirable to consider how one area may be exposed to the acid longer than another, and so to obtain a variety of thin lines and thick, of distance and nearness, light and shade.

The acid-bath must now be considered. The acid or mordant used is nitric acid, and the strength for copper may be 33⅓ per cent nitric acid mixed with 66⅔ per cent of water, and for a zinc plate, which is attacked by acid much more readily, 25 per cent nitric acid in 75 per cent of water. The water must be put into the bottle first and the acid added, otherwise the heat generated may break the bottle. These solutions are not dangerous, with reasonable care, but they must not of course be allowed to get on to the clothes or any valuable surface likely to be burned by their action. Ammonia counters the acid in case of accident.

The acid is poured into a porcelain photographic bath, and the plate carefully inserted. Almost immediately the exposed lines will begin to etch, or bite, the acid forming little greenish bubbles where it is working. A feather may be used to brush the bubbles from the lines, for it is now necessary to judge when the lightest-toned area of the design is sufficiently bitten, so that it may be " stopped out ",

or shielded from further acid action. If the plate is put at such an angle that the light gleams from it into the eyes, the bitten lines will appear dark, and an approximate idea of their strength obtained. When this area of lightest tone in the design is considered to be sufficiently bitten, the plate is removed from the bath and washed thoroughly under a tap. The plate may be lifted from this strength of acid with the fingers, provided the acid is washed off immediately, when rinsing the plate. A piece of blotting-paper may be used to dry the plate, and if the light area proves on careful inspection to be adequately bitten, this portion is stopped out with Jet Glaze or similar varnish, and when this is dry the plate is bitten again, until the next area is sufficiently darker than the first, when it is stopped out in its turn. In this way, in careful stages, the etching is built up, and the final darkest areas will be composed of strong well-bitten lines.

The biting completed, the stopping-out varnish is cleaned off with a piece of soft stockinet and methylated spirit. Turpentine will remove the ground from the plate. A few drops of ether will remove the stopping-out varnish more speedily, and the back of the plate must now be cleaned. The plate is now polished once more and the etching will be clearly seen upon it, particularly with the plate-polish showing up in the lines.

The edges of the plate must now be bevelled outwards from the face with a medium file. If this is not done, there may be damage to the printing paper and to the blankets of the etching-press, as the sharp edges of the plate may cut right through them.

The whole process up to this point has been concerned with materials and substances normally easily obtainable; the etching press, however, presents a different problem. It consists of an iron tray passing between steel rollers, rather like a mangle. Indeed, prints may be obtained by passing the etching plate on a board through the rollers of a mangle, if the top levers can be adjusted to allow the board to travel. If a press is unobtainable, the nearest art dealer will undertake to have the prints pulled by a professional art printer.

If we have a press, or access to one, the plate, cleaned and bright, is heated again, and the etching ink applied to its surface with a composition roller faced with blanket, or with a dabber, similar to that used for laying the ground, but faced with cloth or even an old stocking. The ink may be obtained in tubes, and one of Frankfurt black and another of burnt sienna or burnt umber will suffice

for a beginner. If only a first proof is required, the ink may be applied in little dabs all over the plate, and then rolled up, or dabbed hard and evenly until there is a good dark colour over all, and the ink well driven down into the lines.

The plate is then allowed to cool. A pad of book-muslin, coarse in texture, a little bigger than the palm of the hand, is now made ready, and the plate is wiped with this, using a circular motion. A second wiping with a second pad of finer texture, and the plate is in condition for heating once more. This heating makes the ink in the lines rise up slightly, more ready to be taken up by the printing paper. The paper we are going to use has already been selected—and there is an infinite variety upon which to experiment—and is thoroughly wetted on both sides, then slipped between sheets of blotting-paper.

The press is prepared. The pressure of the rollers is tested perhaps by running an old plate of the same gauge through, and examining the pressure-marks upon a dry sheet of blotting-paper which takes the place of the printing paper. The hot, wiped plate is placed upon the travelling bed of the press, the damp printing paper on top, a sheet of fresh blotting-paper superimposed on that, and over all the two blankets, first the close-textured " fronting ", and then the more woolly " swan-cloth ". The press is now put into action, the plate is carried under the roller once only, and when the blankets are lifted the print is found, perhaps more satisfactory than the etcher has dared to expect.

A " dry-point " is executed on metal, and printed in an identical manner, but in this case there is no ground, and no acid action on the plate. With a point strong enough to furrow the plate, the lines are impressed by force into the metal, casting up a burr upon either side of the line. The relative strength of the line is therefore a matter of muscular force. Mistakes can be corrected by a scraper for removing the burr, and a burnisher to close up a mistaken line. The characteristic dry-point print is strong and beautiful.

Engraving is similar to dry-point, in that the metal is incised by hand, but the engraver does not furrow the plate—but by using a burin of diamond section, he removes a slip of metal with the stroke of the tool.

There are many excellent books on Etching. One that can confidently be recommended is *The Art of Etching*, by E. S. Lumsden (Seeley, Service & Co.).

GYMNASTICS

Gymnastics is one of the finest of sports. Although not practised in Great Britain to anything like the extent to which it is on the Continent, and the gymnasia in this country are poorly equipped by comparison with the magnificent halls and equipment abroad, gymnastics is a form of sport that Britons could easily excel in if they tackled it seriously, as it requires just those attributes that the average Briton possesses, such as patience, determination, perseverance, courage, self-control, quickness of thought and action, and good sportsmanship.

Unfortunately, unlike cricket, football, swimming, boxing, hockey, athletics, &c., it is not encouraged in the schools. This is a great pity, as it is the one form of exercise that assists every other kind, provided it is taught and learned properly. There is no genuine, logical reason why there should not be gymnastic contests between schools, the same as in all other forms of sports and games. In spite of a belief to the contrary, it is a much less dangerous form of sport than any other. With all these points in its favour, it is to be hoped that the boys who read this will be inspired to set to and determine to become real " he-man " gymnasts.

Definition of a Gymnast.

A gymnast is one who is capable of performing exercises of a known character on the apparatus usually found in a recreational gymnasium, such as the horizontal bar, parallel bars, hanging pair of rings, trapeze, pommelled horse, vaulting and long horse, vaulting table, ropes for rope climbing, in addition to being able to perform acrobatic exercises on the mats on the floor. He should be able to swing Indian clubs, and to do exercises with wands, dumb-bells, flags, and other hand apparatus, as well as free standing mass exercises to music, and to take part in pyramids.

How to become a Gymnast.

The first requisite is to join a properly equipped recreational gymnastic club, with as good an instructor as possible. It requires

years of persistent, arduous, steady practice, working to a methodical plan, to become an expert gymnast. It is not too early for a boy to commence apparatus exercises at ten years of age. There are innumerable simple, easy exercises on the tumbling mats and on the apparatus that do not require much effort to accomplish, that will not put an undue strain on a boy of that age, and which will lead gradually to more advanced exercises. If these interesting exercises are learned progressively, and care is taken not to overdo them, the budding gymnast will steadily develop strength, stamina, and skill on the apparatus, and in doing so, will acquire a decided liking for this type of exercise.

The following is a brief list of essentials for becoming a gymnast:

1. Be loyal to your club and instructor.
2. Attend with unfailing regularity, promptly to time.
3. Pay very close attention to all instructions.
4. Observe with the greatest care all demonstrations by the instructor or leader.
5. When attempting any exercise, make it a habit every time to do it to the very best of your ability, thus striving at perfection of movement or position, in other words, " good style "
6. Learn the terminology of the exercises.
7. For rapid advancement, seek the help and advice of your instructor at every convenient opportunity. He is your best friend in the gymnasium.
8. Master one exercise at a time.
9. When several exercises have been learned, put them together in various ways to make voluntaries, or continuous series of movements of your own composition.
10. Always approach and leave the apparatus in the correct manner.
11. Wear proper gym clothing and keep it clean.
12. Aim at always being in the gym team for a display or competition. This is the best way to build up confidence and self-control.
13. Do your utmost to become a leader in your club. Acting as a leader compels one to perform the chosen exercises as perfectly as possible.
14. Learn very thoroughly indeed all mass exercises, such as Indian clubs, wands, dumb-bells, free standing exercises, &c., as they are a great aid to apparatus exercises.

15. Make every attendance at the gym one of enthralling, vivid accomplishment, so that you will look forward to the next lesson with eagerness.

Style.

The " be-all and end-all " of gymnastics is *style*. Style in gymnastics has the same meaning as in any other form of sport. When any movement is done with what appears to be effortless ease, so that it is pleasant to watch, and *looks simplicity itself*, it is said to be done in " good style ". The aspiring gymnast must aim at doing every exercise he is set, whether it be a slow or a quick movement, or a holding position, with gracefulness and controlled ease. Get your instructor, or someone who knows what good style is, to criticize your exercises occasionally. To acquire good style your mind must be concentrated on the exercise you are learning every time you perform it on the apparatus, which means that you have got to think of the position of your head, body and legs, all at the same time, to commence with—a complex and difficult thing to do. Continuous practice on these lines will enable you to become an accomplished, artistic gymnast.

Gymnastic Apparatus.

All apparatus should be standardized. For the Olympic Games, and all international gymnastic competitions, the dimensions of every apparatus are laid down definitely, so that the competitors know the exact conditions under which they are to compete. Unfortunately, in this country, for every gymnastic club that has fair apparatus, there are many that have nothing but rubbish in them. Every pair of parallel bars differs, many of them not being adjustable for height, let alone for width. Those with a wooden base are usually so light and poorly constructed that any dropping exercise performed at one end will cause the other end to tilt up. The horizontal bars are as bad. Most of the wooden ones are so thick that you cannot get your thumbs round. The majority of the leather-covered steel bars are too thick, as well as some of the steel bars. The ropes of the hanging rings ought to be arranged over pulley wheels so that they are instantly adjustable by means of a fool-proof chain and clip attached to the side wall. Some of the vaulting horses are really weird and wonderful. I have experienced more accidents on those with rough hides than those with polished hides, and it is im-

possible to do pommelled horse exercises on those with rough hides. The rough hide appears to be put on in that way for cheapness only. The standard measurements of every apparatus are given in the hope that every gymnastic club will aim at eventually being equipped with modern up-to-date apparatus. The difference in the quality of the work on first-class apparatus and indifferent apparatus has to be seen to be believed.

Apparatus Exercises.

The exercises given here are all of the elementary grade, suitable for the young gymnast. Each exercise should be learned separately; and when several have been thoroughly mastered, begin to put them together to form voluntaries, so that they can be used for displays or competitions. In competitions all " set " exercises, i.e. exercises arranged by the instructor for individual or team competitions which every competitor has to do, must be done without a fault, or a serious loss of marks will result. Each group of exercises leads to a more difficult group. The groups are planned to cover six years' work, two years for each age group, 10 to 12 years, 12 to 14, and 14 to 16. Two practices a week of 1½ hours each should be sufficient. Each practice should be divided into six sections of a quarter of an hour each, commencing with mass free standing or hand apparatus exercises to tune up the body for mat exercises, followed by horizontal bar, parallel bars and rings.

An alternative scheme would be to use three pieces of apparatus, using the last quarter of an hour for " free practice ". Always alternate hanging exercises with exercises in the " rest ", i.e. with the weight of the body supported on the hands. At the end of each year review your progress. This should not be difficult to do. When first attempting a new exercise, do not worry much about style. Get the feeling of the movement first, but as soon as familiar, make every effort to do it in good style. Practise conscientiously on the lines indicated, and at the end of the six years you will be the envy of your friends, and what is more, your strength, skill and stamina will surprise you. The exercises given are by no means all that can be learned in the time suggested by a really determined boy, and if more are required, they can be obtained from any good book on apparatus work.

A final word of warning. The young gymnast, when learning new exercises, must have the help of the instructor or leader, as an

accident is so easily come by, which may take a long time to put right. It is best in the long run to err on the side of safety.

HORIZONTAL BAR

This is a very fascinating apparatus. The more exercises one learns the more one wants to learn. The variety of exercises is never-ending. Many of the more advanced exercises appear to the on-looker to be very hazardous. If led up to correctly, there is really very little danger to the skilled performer, provided he focuses his attention on the exercise he is doing. The high bar swinging exercises have a thrill of their own. One gets a satisfying feeling of elation on finally mastering a difficult exercise. Many of the high bar exercises are first learned on the low bar, i.e. the bar at chest height, as at this height assistance can be given much more easily. To prevent one's hands slipping off a steel bar, one must use Pattinson's carbonate of magnesia. Either magnesia or resin may be used for a leather-covered steel bar or a wooden bar. The bar must be cleaned frequently, or the skin will be badly rubbed or even blistered. The horizontal bar most used to-day is made of unpolished mild steel. It should be 7′ 6″ long and 1⅜″ in diameter, and should be adjustable from chest height to jump height.

The following exercises are arranged progressively in order of difficulty, and are planned to cover six years. It is best for a beginner to commence with the bar at chest height.

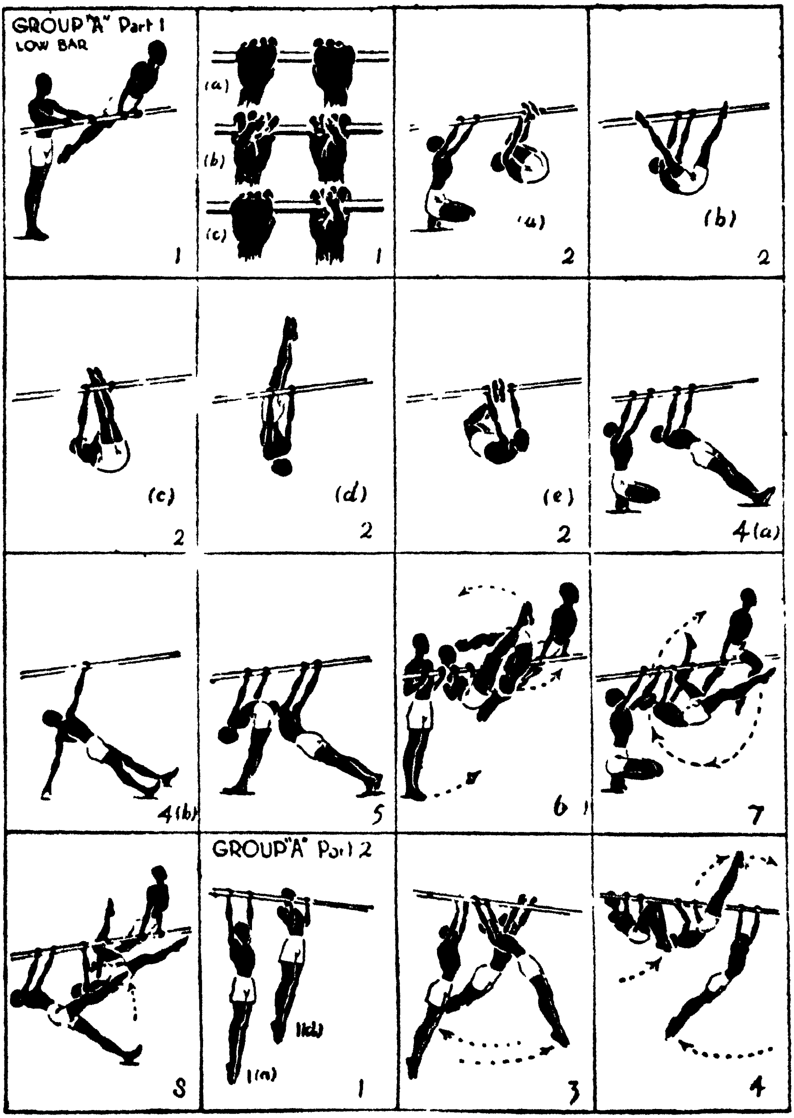
The exercises are described on one side only, but should always be done on both sides. This applies to all apparatus exercises.

Exercises

Group A, Part 1. *Exercises for age group* 10/12 *years, arranged for Low Bar, chest height.*

1. From a front stand, jump up to front rest, with (*a*) ordinary grasp, (*b*) with reversed grasp, (*c*) mixed grasp, i.e. one hand reversed. Dismount facing bar.

2. From a front stand, grasp bar with ordinary grasp, arms bent, chest close to bar, bend knees to full knees bend, and from this position, raise legs:
   (*a*) with legs bent, knees together and through arms, and place front of insteps against bar;



Horizontal bar

(*b*) with legs straight and wide apart, insteps against front of bar;
(*c*) with legs straight and through the arms, heels against the bar;
(*d*) with legs straight and through the arms, in the stretched inverted hang;
(*e*) with legs bent and through the arms, insteps against the bar, back hollowed in the "nest" hang.

3. From the foregoing exercises (*a*) to (*e*), the return to the stand may be made by:
   (*a*) passing the legs forward, and lowering, bending the arms and returning to the stand frontways;
   (*b*) somersaulting backward to the stand with bar behind the back.

4. From starting position as in No. 2:
   (*a*) stretch legs forward to hang with straight arms and heels on the floor, head, body and legs in one straight line, face upward;
   (*b*) from position (*a*) but with feet apart, release grasp of left hand and touch floor, turning sideways, and return.

5. From a stand back towards and close to bar, bend forward and raise arms backward, grasp bar, stretch legs backward, toes on the floor, arms straight, head, body and legs in one straight line, face downward.

6. From a front stand, bar chest high, raise legs forward and upward, circling bar to front rest with:
   (*a*) ordinary grasp;
   (*b*) reverse grasp;
   (*c*) combined (mixed) grasp.

   Finish with forward roll to front stand.

7. Knee upswing. From starting position as in Ex. 2, raise legs, (1) pass left leg between arms, grip bar with knee, straighten right leg, swing it up and down two or three times and finally rise forward above bar, fall backward, take left leg out from between arms and come to front stand; (2) same as (1), but leg outside left hand.

8. From starting position as in 7 (1), swing right leg up and down two or three times, and finally circle up backward to the rest above the bar.

Group A, Part 2. Exercises on the High Bar, at jump height.

1. Jump to the hang with (*a*) ordinary grasp, (*b*) reversed grasp, (*c*) mixed grasp, and (*d*) with bent arms.

2. From a front stand about a pace away from the bar, jump to the hang ordinary grasp and swing to and fro, renewing the grasp at the end of the backward swing; drop off at the end of the backward swing.

3. As 2, but at the end of the backward swing raise left hand and replace quickly, same right, same both.

4. Jump to the hang with a slight swing, pull up, raise legs, shoot them forward and underswing, swing to and fro and drop at the end of the backward swing.

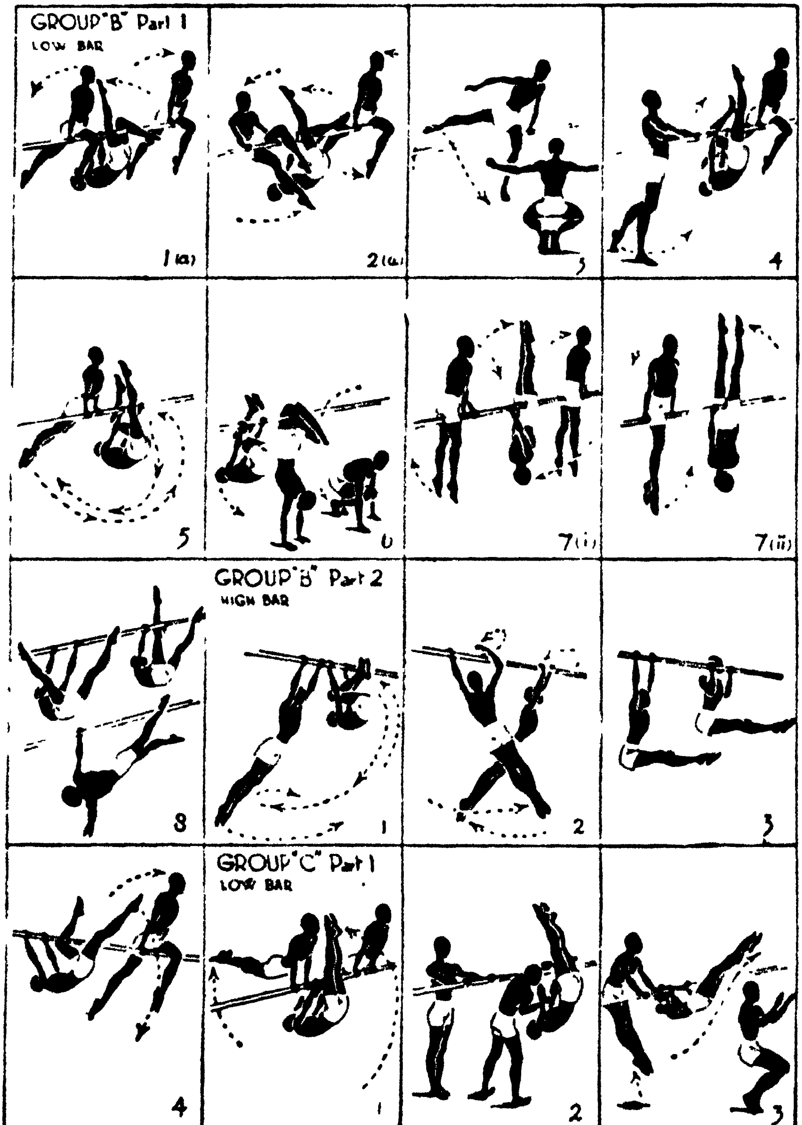
Group B, Part 1. Exercises for age group 12/14, arranged for Low Bar, chest height.

1. (*a*) Jump to front rest, pass left leg over bar outside left hand, left leg coming to rest between hands, fall backward below bar, grip bar with left knee and on first swing of right leg rise forward above bar.
   (*b*) Same as (*a*), but fall backward with left leg outside left hand.

2. (*a*) From starting position 1 (*a*), left leg between arms, knee circle backward to rest again.
   (*b*) Also with leg outside left hand.

3. From starting position 1 (*a*), dismount by reversing grasp of left hand and throwing right leg over bar, alighting with a left turn.

4. From a front stand with ordinary grasp and left leg raised,
   (*a*) spring off right foot, pass left leg under bar between arms, knee upswing right, finishing as Ex. 3.
   (*b*) As (*a*), but left leg outside left hand; finish as Ex. 3, shifting left hand outside left leg.



Horizontal bar—continued

5. From a front stand with ordinary grasp, (*a*) circle backward to the front rest, drop backward and knee up swing right (right leg acting), left leg between arms.
   (*b*) As (*a*), but left leg outside left arm.

6. From a front stand on toes, spring up, fall backward and raise knees, pass them through the arms and grip bar with both knees, release grasp of hands, hang head downward and place hands on floor, throw legs off bar coming to crouch position and immediately roll forward under bar to the stand with back to the bar.

7. (1) Jump to the front rest, pass right leg over the bar to the riding seat facing left with straight legs, both hands grasping bar in front of body:
   (*a*) fall sideways to the hang upside down;
   (*b*) later, fall sideways and complete circle round the bar back to the starting position (mill circle).

   (2) Riding seat with straight legs, right leg in front with hands in ordinary grasp:
   (*a*) fall backward to the upside down hang;
   (*b*) later, fall backward and complete circle round the bar back to starting position (mill circle).

   (3) Riding seat with straight legs, left leg in front, hands in reverse grasp:
   (*a*) fall forward to the upside down hang;
   (*b*) later, fall forward and complete circle round the bar back to starting position (mill circle).

8. From a front stand with ordinary grasp, raise both legs to the bar wide astride, insteps against bar, pass right leg between arms, release grasp of left hand and turn face downward, hanging on right hand and left foot, return to starting position and drop to the ground.

Group B, Part 2. Exercises on the High Bar, at jump height.

1. Underswing, and at the end of the forward swing raise knees and bring them between arms, swing slightly backward and on the forward swing, continue underswing again. Repeat this exercise two or three times in succession.

2. Swing as 4, Group A, Part 2. At the end of the forward swing make half turn left, releasing right hand and regrasping, hands now in combined grasp. Repeat right.

3. Jump to the hang with ordinary grasp, raise legs to the half-lever, pull up to bent arm hang and lower retaining half-lever.

4. Underswing with ordinary grasp, at the end of the forward swing raise legs, pass left leg under bar outside left hand, swing right leg downward and rise above the bar (right leg acting), fall backward, take left leg off bar and drop at the end of the backward swing.

Group C, Part 1. Exercises for age group 14/16, arranged for Low Bar, chest height.

1. From the front rest, circle the bar backward to the rest again.

2. From a front stand with ordinary grasp, with help, clear short circle backward from the ground back to starting position.

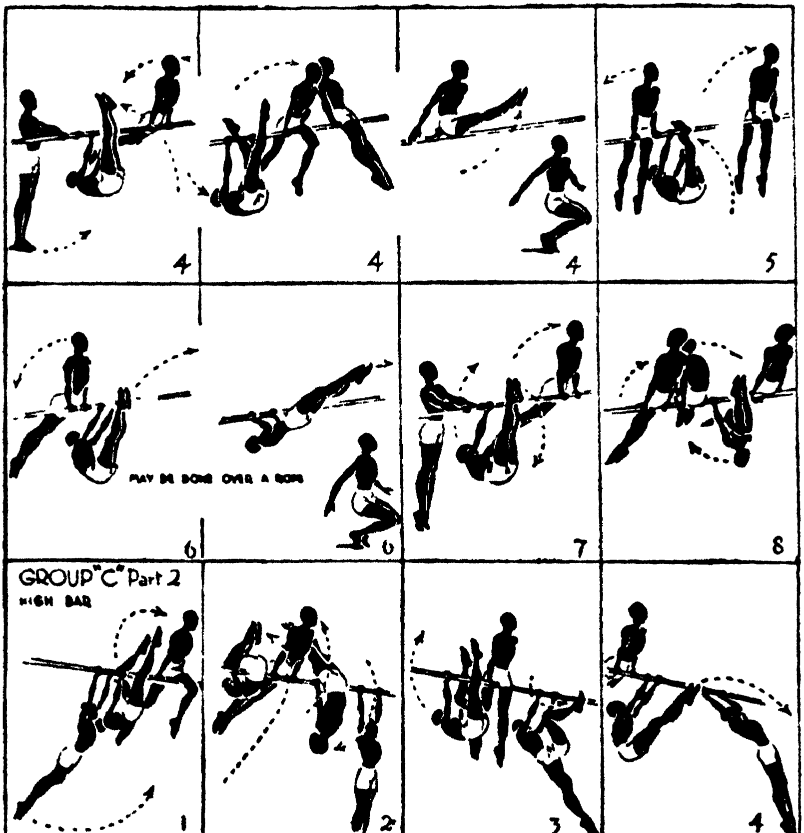
3. From a front stand with ordinary grasp, jump up, fall backward, immediately raise feet to the bar and underswing forward to the ground (shoot to the front).

4. From a front stand, circle bar backward to the rest, drop backward raising both feet to the bar, legs straight, make a beat and pass left leg through the arms quite straight and rise to the rest, pass right leg over the bar and come to the back rest, raise legs to the half-lever quickly, push forward and drop to the ground.

5. From the riding seat left leg forward, fall backward letting left heel and right instep come to the bar, and on the return swing, shoot both legs forward and upward and rise above the bar with straight legs.

6. Jump to the front rest, fall backward, feet to the bar and underswing (shoot to the front). This exercise can be done over a rope, gradually raising it until the rope is level with the bar.

7. From a front stand, ordinary grasp, rise on toes, spring up and fall backward, whip feet to the bar and beat upstart to the front rest.



Horizontal bar—continued

8. From the back rest raise both knees and support weight on both hands, fall backward and seat circle backward to the starting position. (Assistance needed.)

Group C, Part 2. Exercises on the High Bar, at jump height.

1. Underswing, at the end of the forward swing, raise legs, pass left leg through arms, grip bar with left hock, swing right leg downward and rise above bar, fall backward, take left leg out from between arms and drop at the end of the backward swing.
2. Jump to the hang with bent arms and knees and circle bar to the rest, roll forward and lower to the stretch hang, drop to the ground.
3. Underswing, at the end of the forward swing, raise legs, pass left leg between arms and half mill circle forward to riding seat, left leg forward above bar, one mill circle backward, drop back, leg out, swing, and drop at the end of the backward swing.
4. Jump to the hang with ordinary grasp, circle bar to the front rest, fall backward, feet to the bar, and shoot to the front.

ACROBATIC TUMBLING EXERCISES

For tumbling exercises, either an agility mattress, rubber mats, or 6′ 0″ × 6′ 0″ × 2½″ coconut mats are a necessity. They should be prevented from sliding about. Many of the exercises require great suppleness, which is developed as progress is made.

Speed of thought and action are a prime requisite. A good acrobat can save himself from injury through his training in this branch of sport. An acrobat learns the art of falling and avoiding injury. The earlier one commences tumbling the better, as some of the exercises become extremely difficult to learn after fifteen years of age. All acrobatic exercises are an aid to apparatus work. Progress in tumbling exercises should be made slowly. Repeat the more simple exercises many times until you can do them almost perfectly. It is safest to go boldly for the exercises, as it is usually the timid ones who get hurt. Confidence and self-assurance is gained as progress is made. The exercises given here are arranged for the three age groups as in the apparatus work.

Exercises for the age group 10/12.

1. Various jumps, hops, leaps, in the directions forward, backward, sideways, off one or both feet, landing on one or both feet, with various turns.
2. Simple forward roll. This is done by standing on the mat, bending the knees as much as possible, placing the hands on the mat outside the knees, knees together, bending the head forward so that it is touching or almost touching the knees, giving a spring off both feet and a push with the hands, rolling over completely doubled up, so that the feet finish flat on the mat and it is quite easy to stand upright. Once the hands leave the mat at the commencement of the roll, every effort should be made to stretch the arms forward, so that when the erect position is reached the arms are still raised forward. Avoid putting the top of the head on the mat. Only the back of the head and the shoulders should touch the mat.

   The following are variations of the simple forward roll:

   (*a*) From a stand at the edge of the mat.
   (*b*) With one step forward off left (right) foot.
   (*c*) With a jump forward off both feet.
   (*d*) Standing dive and forward roll, starting position, and take off as for plain standing header off a firm board.
3. Other variations of forward roll:

   (*a*) With left hand on hip, right arm raised, forearm across the face. Maintain this position throughout the roll until standing again.
   (*b*) As (*a*), but arms reversed.
   (*c*) With arms folded, keeping them in this position until the standing position is reached again.
   (*d*) With hands on top of head, fingers locked.
   (*e*) With hands on hips throughout.
   (*f*) With hands grasping ankles throughout.
   (*g*) Holding one leg with one hand, the other hand on the hip.
4. All the foregoing exercises may be done with:

   (*a*) legs crossed, (*b*) a turn about after crossing the legs, (*c*) twice or three times in succession, (*d*) legs wide apart

5. Dive over object, or boy kneeling down, followed by another roll.

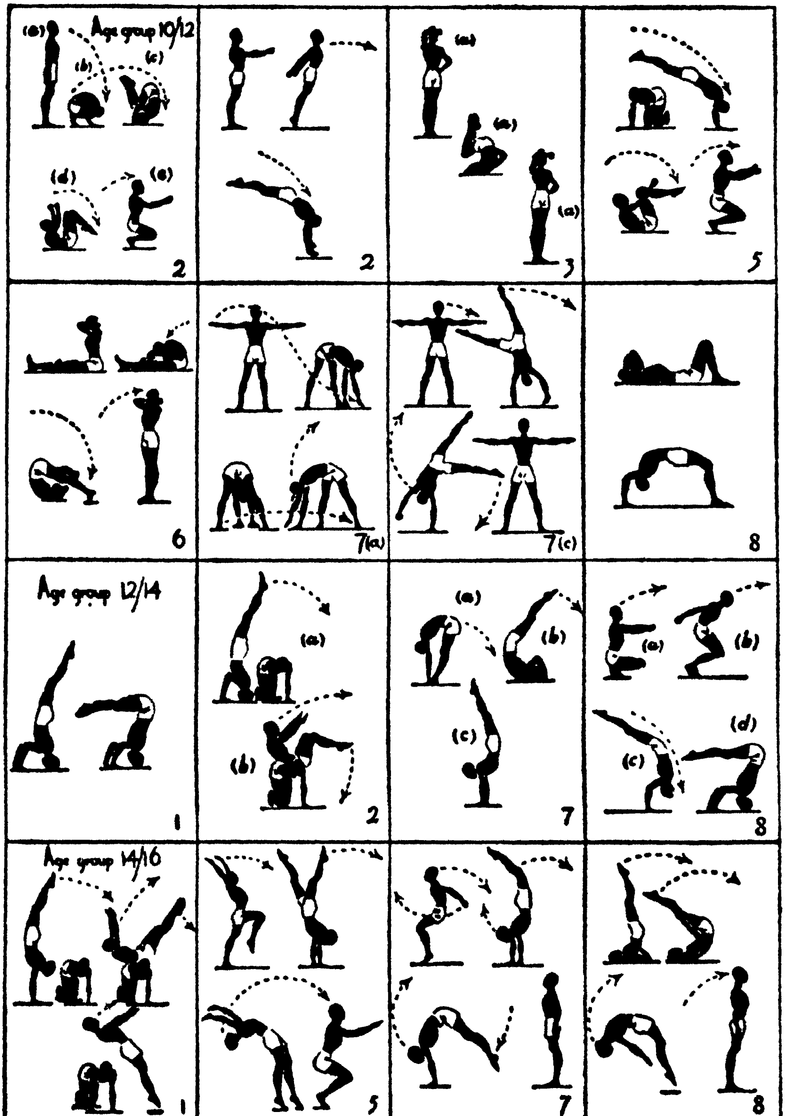
6. Back roll. When first attempting this exercise, sit down with legs wide astride, and with hands locked behind the back of the neck. Bend body forward and then roll backward, raising the legs as soon as the roll is commenced. Allow the legs to go right over head, toes touching the mat, but without completing the roll, and return to starting position. Do this until familiar with the movement. Later, complete the roll, keeping the legs well apart, and giving a vigorous push with the forearms. The next stage is with the hands over the shoulders. Also do it with knees and feet together.

7. Cartwheel. Preliminary exercises for cartwheel.
   (*a*) Walk round the hands, i.e. from a stand with the legs astride bend sideways to the left and place left hand on the floor close to the left foot, fingers pointing backward, then place right hand parallel with the left in line with feet, next throw the right leg across the arms, right foot parallel with right hand, having made a half turn (or turn about), then throw the left leg across and stand upright, making a further half-left turn to face the same way as at the start.
   (*b*) Repeat this, but speeding up the movements, taking more and more weight on the hands until partly doing the cartwheel, but the legs very low.
   (*c*) Gradually raise the legs higher and higher until the cartwheel proper is being done.

8 The Bridge. Lie on the back with knees bent, feet flat on the floor, place hands over the shoulders, hands flat, fingers pointing to the feet. Give a vigorous push with the hands and straighten the arms, arching the back until the " Bridge " is formed. The next step is to walk forward, backward and sideways in the position.

Exercises for age group 12/14.

1. Head stand with assistance. To perform a head stand, make a triangle with the hands and head, fingers pointing forward. The balance can be reached by (*a*) throwing one leg up at



Tumbling

a time, (*b*) by jumping off both feet together with knees bent or with legs straight, (*c*) by raising the legs slowly, keeping legs straight throughout.

2. Headstand roll over back or object, such as top section of box or rolled up coco-nut mat.
3. Headstand, followed by forward roll and all the variations.
4. From starting position for headstand, raise legs slowly until they are horizontal, and hold, followed by raising them slowly until headstand is reached. Return slowly until horizontal position is reached. In this position part and close legs. This position is called " horizontal headstand ". Hold headstand, legs erect, part legs and hold V position.
5. Dive rolls over objects for length or height.
6. Handstand with and without assistance, followed by various rolls.
7. Backward roll to handstand. Assistance is usually needed for this for some time. It is best to have two helpers, each catching one leg and hoisting them upward so that the handstand is reached, the performer arching his back very strongly as soon as any weight is felt on the hands.
8. From the full knees bend, arms forward raised, body erect starting position, spring forward into the " angle headstand " and hold this position. After the spring the hands must come to the mat first, the head going well forward to form the triangle, the legs straightening.

Exercises for age group 14/16.

1. Handstand roll over object or back of boy kneeling " all fours ", i.e. on hands and knees. The arms must be kept straight to perform this exercise correctly.
2. Headspring (*a*) off the top section of the box, or rolled up mat, (*b*) off the head pad, (*c*) off the level mat. The headspring can be done with single or double take-off. from starting position as in Ex. 8, age group 12/14, or with a run.
3. Balance on hands and knees of boy lying on back with knees bent, feet apart and flat on the mat, arms raised forward. The balancer should place one foot well forward between the

supporter's legs, grip the legs just above the kneecap, thumbs round, place the shoulders in the supporter's hands, and before attempting to throw upside-down, fully straighten the arms. When throwing into the balance, keep the head well back and look straight into the face of the supporter. This is a very easy balance, but assistance will be needed at first.

4. Handspring over boy lying on his back with his knees bent, feet flat on the mat and arms raised forward, (*a*) round back, (*b*) hollow back, with single and double take-off, from a stationary position and with a run.

5. Handspring. First practise throwing into a handstand with a single take-off, i.e. raising one knee high and then thrusting it rapidly to the floor, at the same time placing the hands on the floor and throwing the legs up into a hollow back handstand against the wall. When this is well mastered, try the handspring with assistance, until capable of doing it without assistance.

6. Fly spring. This is done with a double take-off, i.e. with a jump off both feet together on to the hands, turning over and completing the handspring with a hollow back on to the feet. It is best to go for this with assistance as soon as a single take-off handspring has been mastered.

7. Back handspring. This needs assistance with a strong belt fastened round the waist, with ropes attached, controlled by a helper on each side. Practise also the back bend, throwing legs upward, passing through the handstand on to the feet. The back handspring is done with a vigorous jump upward and backward, at the same time throwing the head backward and the arms strongly upward and backward. This requires careful, skilled assistance, and a great deal of practice.

8. Upstart. This is done with a beat of the legs from the back lying position. To perform this exercise, lie on the back, raise legs as for " cycling ", i.e. legs and body vertical, supported by hands under back, and elbows on the floor. Keeping the legs straight, drop them quickly and bend from the hips, at the same time place the hands under the thighs. A strong beat of the legs upward, a push from the hands and a sharp

hollowing of the back brings the performer up on to the feet. A few practices with two helpers are necessary to acquire the correct beat and timing for this fascinating exercise.

PARALLEL BARS

This is a fine apparatus on which boys may do many delightful exercises. If anything, a larger variety of exercises can be learned by boys on this apparatus than on any other.

The best-made bars are constructed with a metal base, and the bars themselves have a steel core through them. The base should have castors under each upright that can be lowered to raise the base off the floor so that the bars can be easily moved. Some bars have a roller that can be fitted easily to the centre of the base, and by means of a simple lever, the bars can be raised for moving from one place to another. The bars should be 10′ 0″ long, oval-shaped, 2″ deep × 1½″ wide, 3′ 9″ from the floor at the lowest, adjustable up to 5′ 6″ high, and also adjustable for width. The uprights should be made to slide up and down, with a foolproof device for fixing at the various heights. Small boys should not work them too wide apart. Parallel bar exercises are definitely *not* harmful to growing boys, provided due attention is paid to the type of exercise taught, and good style.

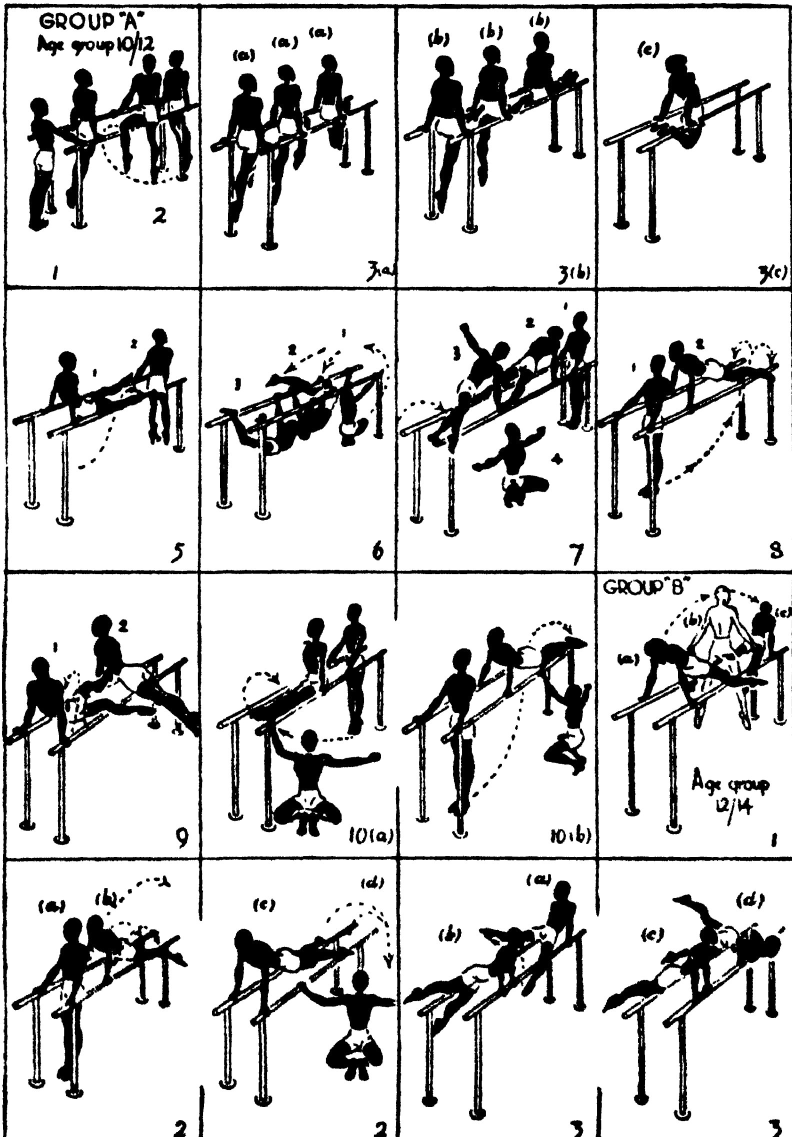
Exercises

These may commence at the near end facing inwards, in the middle, at the far end facing outwards, or from the sides. They may be done in the cross rest, i.e. with the weight supported on both hands, or in the hang on both hands below the bars.

Boys should concentrate mainly on quick, or swinging exercises, those requiring chiefly speed and skill. Commence with the bars about chest height, or the lowest height. The exercises are described to one side only, but should always be done on both sides.

Group A. Exercises for age group 10/12.

1. From a cross stand at the ends or between the bars, jump to the cross rest several times in good style.
2. From a cross stand at the end of the bars, arms straight, jump up raising the legs forward, swing to and fro and sit in the outside cross seat on the left bar in front of the left hand. Dismount sideways.



Parallel bars

3. Jump to the cross rest in the centre of the bars and raise and lower (*a*) left, right, both knees, (*b*) left, right, both legs, (*c*) arch back, press head backward, and raise heels as near back of thighs as possible.

4. Inside bars, jump to the cross rest and (*a*) raise and replace hands alternately on spot, (*b*) walk forward, moving one hand after the other, (*c*) walk backward.

5. At the ends facing inward, swing in the cross rest to the riding seat on the left bar in front of the left hand, swing between and repeat right, swing between and drop at the end of the backward swing.

6. At the far end facing outward, grasp bars with outside grasp, sink to full knees bend, with a jump raise legs, turn over backward, place feet on the bars and slide them along to the stretch hang, on feet and hands.

7. From a cross stand at the near end, swing and place feet on bars in front of hands, in the back leaning rest, turn on left hand and raise right arm, dismount over left bar to the ground.

8. From a cross stand at the far end facing outward, jump up and swing to and fro, and at the end of the backward swing place feet on bars in front leaning rest. Dismount over left bar to the floor.

9. From a cross stand at the near end, jump up and swing, at the end of the forward spring, place left leg over right bar in front of right hand, quarter turn left to the front leaning rest across both bars, dismount by pushing backward, catching rear bar with both hands when alighting.

10. From a cross stand in the centre of the bars, jump up and swing to and fro, and at the end of the forward swing, (*a*) rear vault over left bar to the ground, or at the end of the backward swing, (*b*) front vault over left bar to the floor.

Group B. Exercises for age group 12/14.

1. At the near end facing inward, jump up and swing, at the end of the forward swing straddle bars, place hands in front of legs, swing between and (*a*) repeat the straddle, (*b*) finish with a front or rear vault, (*c*) swing to back leaning rest and dismount sideways.

2. At the far ends (*a*) facing outward, swing and (*b*) straddle bars behind hands, place hands behind legs and swing between to (*c*) front leaning rest. Dismount sideways.

3. Inside cross stand in centre of bars, swing and (*a*) place right leg on right bar in front of right hand, (*b*) quarter turn left to (*c*) front leaning rest across both bars, (*d*) bend both arms and raise one leg, and return, repeat opposite leg, dismount.

4. At the near ends facing inward, swing to outside cross seat in front of left hand, hands in front, swing between to outside cross seat in front of right hand, hands in front, and swing between to straddle seat in front of hands, hands in front, swing between and dismount forward.

5. Inside cross stand in centre of bars, swing to outside cross seat on left bar in front of hands, rear vault over both bars to ground.

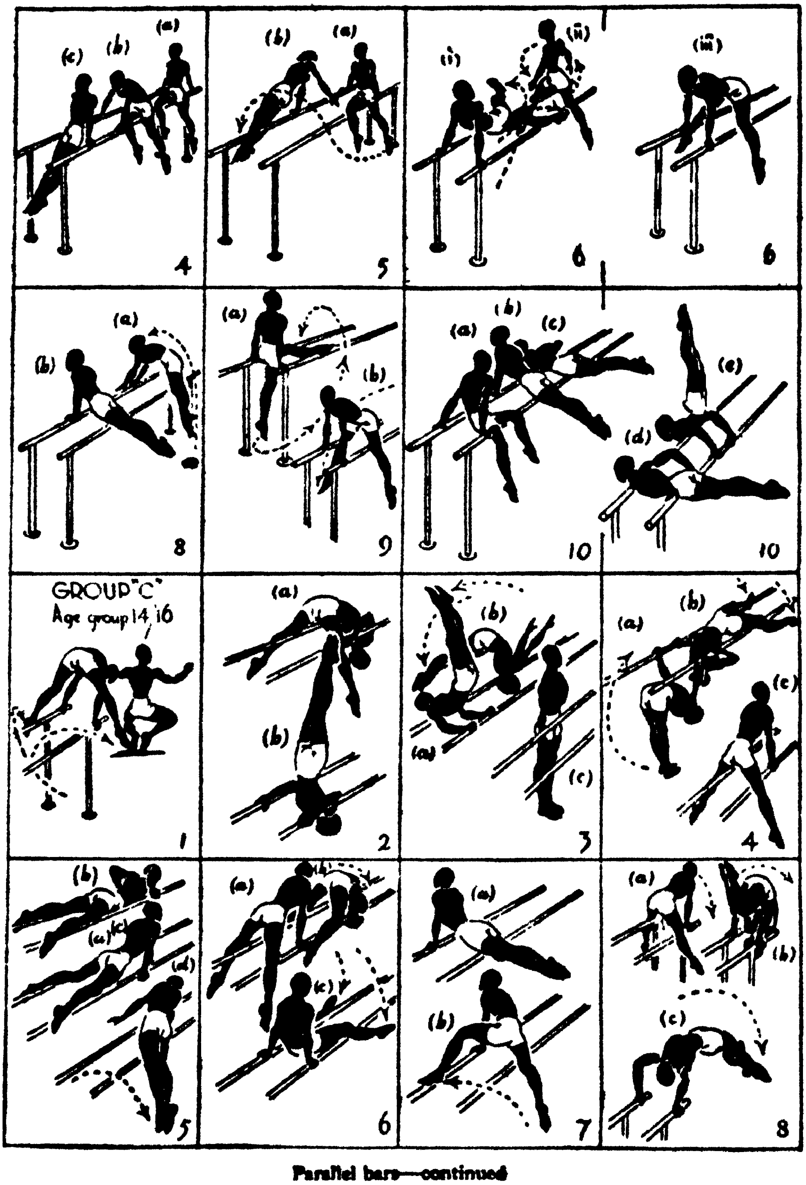
6. At the near ends facing inward, swing and front scissors left, i.e. cross legs at the end of the forward swing and come to the straddle seat with a left about turn.

7. At the far ends facing outward, swing and back scissors left, i.e. cross legs at the end of the backward swing and come to the straddle seat with a left about turn.

8. From an outside side stand in the centre of the bars, grasp bars, (*a*) jump and transfer hands on to the far bar, coming to (*b*) the front leaning rest across both bars, dismount backward to the floor.

9. At the near ends facing inward, jump to cross rest, (*a*) raise left leg to half-lever and place on right bar in front of right hand, turn left about, changing hands and circling right leg over both bars to (*b*) the straddle seat, swing and front vault behind left hand.

10. From an inside cross stand in the centre of the bars, swing to (*a*) outside cross seat on right bar, quarter turn left to (*b*) front leaning rest across both bars, (*c*) bend arms and lower chest to bar, (*d*) change hands on to rear bar, throw legs up coming to chest balance, lower legs (*e*) and return to front leaning rest and dismount.



Parallel bars—continued

Group C. Exercises for age group 14/16.

1. At the far ends facing outward, swing and straddle forwards over both bars to the ground. (Assistance needed.)
2. At the near ends facing inward, swing to straddle seat in front of hands, place hands in front of legs, lower shoulders to the bars and allow them to slide through below the bars until hanging on the forearms, raise legs and hang in forearm balance upside-down, roll forward to the straddle seat again.
3. From an inside cross stand in centre of bars, swing to outside side seat on right bar, fall backward and lie across both bars face upward, raise legs over face and roll over backward to the stand facing the bars. (Assistance needed.)
4. At the near ends facing inward just between bars, bend forward and downward, raise arms backward and grasp bars, forward roll below the bars to the straddle seat above the bars.
5. From an inside cross stand in the centre of the bars, swing to front leaving rest, bend arms, stretch arms, swing between and front vault right with a left turn to face bars.
6. At the near ends facing inward, swing to straddle seat in front of hands, grasp bars in front of legs and round back forward roll to straddle seat.
7. From an outside side stand in the centre of the bars, grasp bars and jump to front leaning rest across both bars, place left foot on far bar and flank vault over both bars to the ground.
8. At the far ends facing outward, swing and straddle seat behind the hands, lift and round back handspring to the ground. (Assistance needed.)

THE RINGS

The rings may be used either stationary or swinging. Both types of exercises need a firm grip. There is not quite such a variety of exercises as on the horizontal bar and parallels, and not being of a fixed character, they require rather more strength and control. They most certainly develop great arm and shoulder strength. Many of the very advanced exercises are exceedingly difficult. The exercises given here are arranged progressively, and should be thoroughly mastered. When working rings at chest or head height,

6. Hang with straight arms and with legs straight and over face, place left leg over left arm and lower right leg to horizontal hang, face upwards, return to starting position and repeat right side.

Group C, for ages 14/16.

1. Hang at stretch height, (*a*) pull up to bent arm hang and lower, (*b*) exercise (*a*) with knee raising and lowering.
2. At head height, grasp, jump upward and backward and turn hollow back somersault backward to the floor.
3. At head height, part arms sideways, bend forward and forward dislocation to bent arm hang, swing legs to and fro and hollow back somersault backward to the floor.

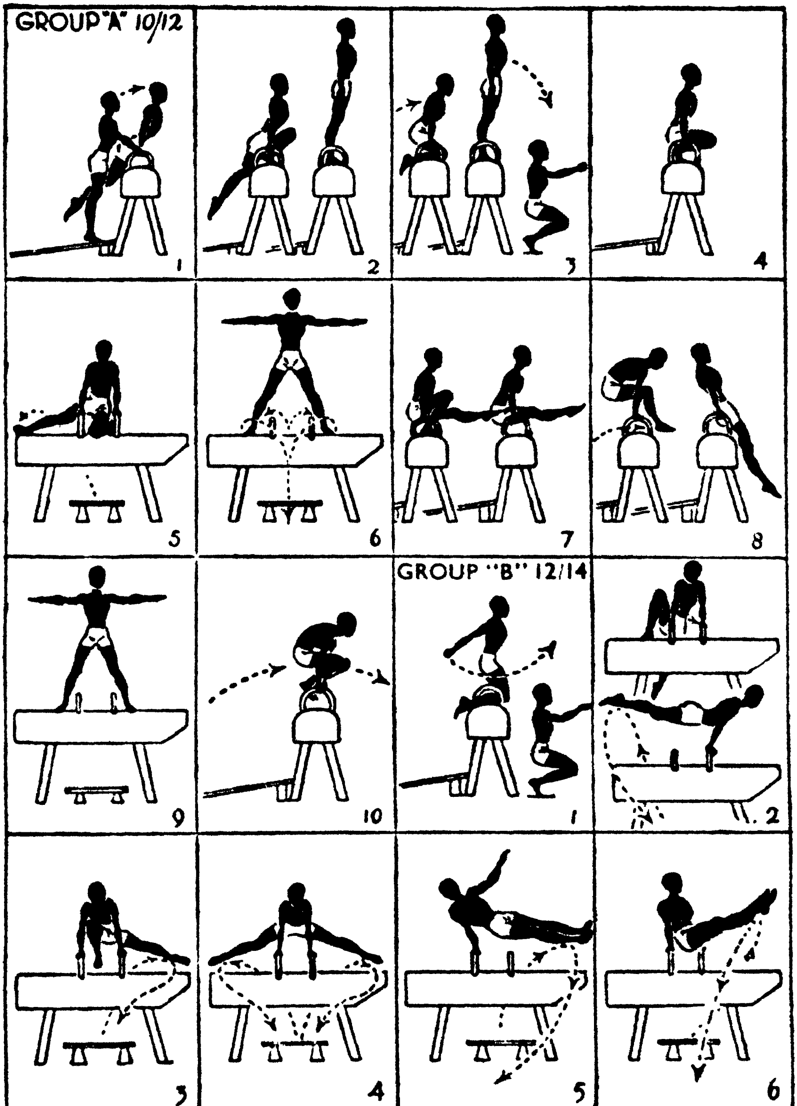
Swinging Exercises.

4. At comfortable stretch height, run forward and raise legs as high as possible, swing backward with a beat on the floor with the feet, repeat swings, alight at the end of the backward swing.
5. Swing, and at the end of the forward swing raise legs over face and hold on backward and forward swing, at end of forward swing lower legs, at end of backward swing drop to the floor.
6. Swing, and at the end of the forward swing raise legs over face, place feet in the rings and hollow out to the " nest " hang on the backward swing, return to hang with the feet over the face, lower legs and drop to the ground at the end of the backward swing.

THE VAULTING HORSE

The vaulting horse is, if anything, the easiest apparatus of all to master; but on the contrary, the exercises on the pommelled horse are quite the most difficult to accomplish.

All the vaults may be led up to very gradually, so much so that the transition from the leading-up exercises to the exercise itself is scarcely noticeable. The vaults may be done with a springboard, a beating board, or off the floor. I advise, up to sixteen years of age at any rate, a springboard. After that age experiment with a beating board, or off the floor, and then use your own discretion.



The vaulting horse

As on every other apparatus, aim at a polished performance with every exercise. Every vault has its own peculiarity, and the secret of good vaulting is the correct distribution of the weight of the body on the hands. In this respect almost every vault differs.

The horse should have adjustable legs, for raising and lowering. Up to sixteen years of age a horse 5′ 6″ long is best. The pommels should be 5″ high.

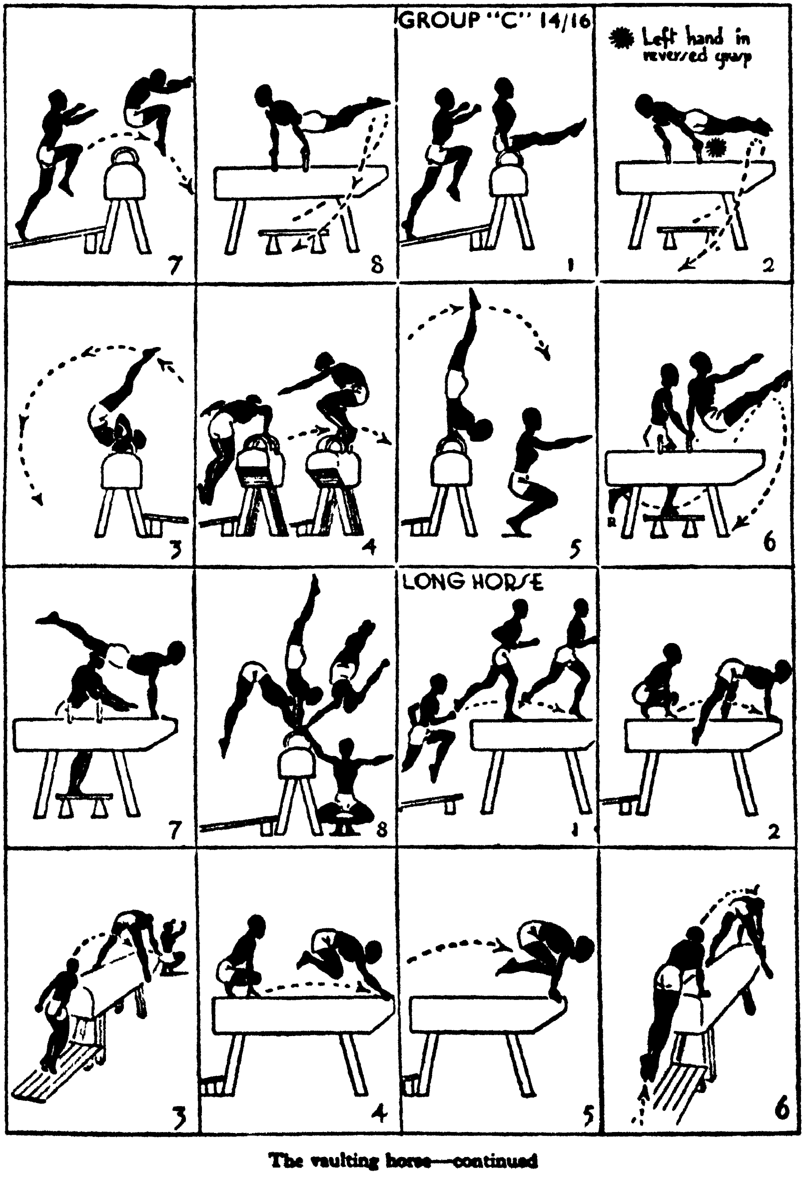
Group A, for ages 10/12. Horse broadways, legs in lowest slot.

All exercises are preceded with a short run, and unless otherwise stated, the take-off from the springboard is off both feet together.

1. Jump to the front rest with the hands slightly beyond the centre of the pommels, and dismount backward to the board.
2. Jump and squat one foot on the saddle, stand up and jump forward to the floor.
3. Jump on to both knees on the saddle, neck (left end of the horse), and croup (right end of the horse), stand up and jump forward to the floor.
4. Jump and squat both feet on the saddle, neck or croup, stand up and jump to the floor.
5. Jump on left knee on saddle and place right foot on croup, right leg straight, dismount on far side of horse.
6. Jump to squat stand on saddle, stand up, jump to the stride stand on the horse, feet outside the pommels, jump forward.
7. Jump to squat stand on one foot on the saddle, the other leg stretched forward to half-lever, straighten bent knee forward and push to the floor.
8. Jump and squat legs through arms to back rest, raise legs forward and push to the floor.
9. Jump to stride stand, feet outside pommels, and jump to floor.
10. Jump and quick squat through arms to the floor.

Group B, for ages 12/14. Horse broadways, legs in second slot.

1. Jump to the kneel on both knees, hands off pommels, swing arms backward, and on forward swing of arms jump off both knees forward to the floor.



The vaulting horse—continued

2. Jump and place right foot on croup, left leg hanging down, turn and face horse and change right hand on to left pommel, swing left leg upward and front vault dismount.
3. Half straddle left and right.
4. Full straddle.
5. Flank vault left and right.
6. Rear vault left and right.
7. Run, take one foot off the board and clear jump.
8. Front vault left and right.

Group C, for ages 14/16. Broad horse, legs in third slot.

1. Thief vault, taking one foot off the board as for clear jump.
2. Screw vault left and right.
3. Round back handspring.
4. Back squat left and right.
5. Hollow back handspring.
6. Fencing vault left and right.
7. Front vault with hands on neck instead of pommels; also with hands on croup. Good spring required to raise legs clear of pommels.
8. High front vault.

Group C, for ages 14/16. Long horse.

1. Run, take one foot off springboard on to other foot on to near end of horse and run over.
2. Squat on to near end and long fly off far end.
3. Long fly.
4. Squat on to near end and squat through off far end.
5. Long squat.
6. Long fly, touching near and far end.
7. Long squat, touching near and far end.
8. Neck roll off far end.

Vaulting Horse.

Group A, for ages 10/12.	*Broad horse* 1–10	16
Group B, for ages 12/14.	*Broad horse* 1–6	
Group B, for ages 12/14.	*Broad horse* 6–8	
Group C, for ages 14/16.	*Broad horse* 1–8	16
Group C, for ages 14/16.	*Long horse* 1–6	

AN HOUR WITH A MICROSCOPE

If you are fortunate enough to be presented with a microscope, two questions will arise immediately in your mind: "How does it work?" and "What shall I do with it?" The first question is much easier to answer than the second.

Microscopes vary enormously—from types little better than a magnifying glass up to very costly and delicate pieces of mechanism which only an expert can handle properly. Let us assume that a simple but efficient little instrument is yours; its cost should not exceed a few pounds. It comprises a double brass tube which telescopes by hand movement into a holder-arm. At the upper end is a lens called the eyepiece; at the lower end is a second but double lens, known as the objective. When the tube is closed, the combination of these lenses magnifies an object about 25 diameters. As the tubes are cautiously lengthened one increases the magnification, up to a maximum of 225; this is quite sufficient for a beginner. One studies the object through the eyepiece, by light which is reflected up the tube from the concave mirror passing through the object. The object itself—a hair, a piece of leaf, a speck of dust, or a spot of water, for example—rests on a thin glass slip which is held in place upon the stage by two clips. If you want a larger or flatter view of the object, unscrew the lower half of the object glass; but of course this reduces the magnification.

In using your miscroscope, you should place it in such a position that you can easily concentrate the light so that you see it centrally when viewed through the eyepiece; there are several other ways of lighting an object, but this will do to start with. The light should be as bright as possible, ordinary daylight through a clear window, or an electric light. Do not ever try to focus the sun direct in the lens, if you value your eyesight. If special illumination is required, extra apparatus is necessary. Light may be concentrated by a system of lenses called a condenser, which as a rule is screwed (in more expensive instruments) under the stage. Many objects requiring only low powers, and in which you, as a beginner, are certain to find pleasure, are best viewed opaque, i.e. with no light passing through

them at all. For these, the slide beneath them can be covered over with black paper, while the light is concentrated on them from the side; for this purpose one uses a small electric bulb in a holder,

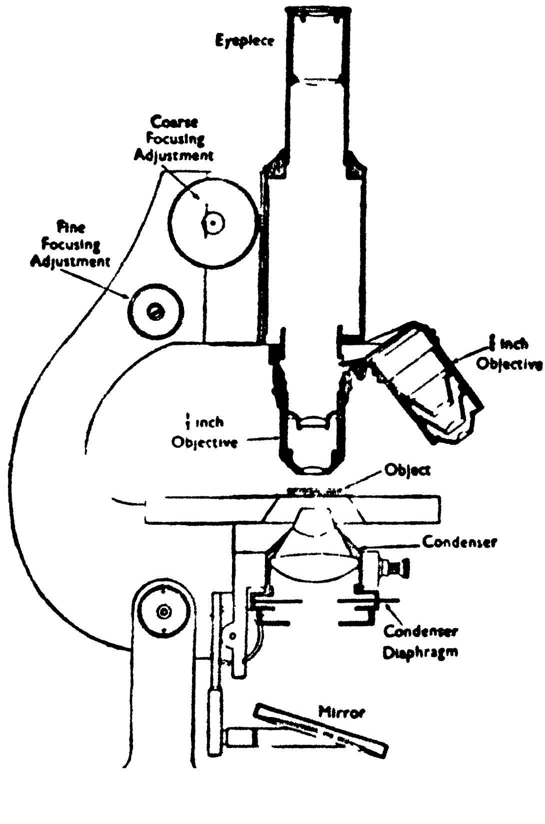


Fig 1

the bulb being covered so that the light escapes only from one small circular " window ". This kind of lighting is called dark-ground illumination; it is very effective with a 1" objective, when examining the delicate network of corallines upon a seaweed, or the many kinds of yellow pollen grains, or the beautiful ivory-hued or dead white shells of some Foraminifera.

Having got the light to your liking, place the slide on the stage and adjust the height of the tube until you see the object (if it be flat) sharply and clearly; you may then, by very slightly turning the milled thread in the holder, obtain a perfect focus. When looking down a microscope tube people commonly shut one eye; this is quite unnecessary, and by training you can soon learn to use the instrument with both eyes open.

In more expensive microscopes, of which fig. 1 represents one of the most usual patterns, there are several eyepieces of different strength, which can be changed at will; and also several objectives; to save time and labour, two or three objectives are usually screwed on to the multiple nosepiece, as shown in the drawing. Under the stage is a condenser, also a system of overlapping metal leaves called an iris diaphragm, because (like the iris of the eye) it enables the circle of light to be reduced to any extent desired. All good microscopes rest on heavy, usually horseshoe-shaped stands, so as to keep them rigid and immovable. They also contain a special screw mechanism for fine adjustment, to bring the specimen perfectly into focus; this fine adjustment should never be used more than necessary, otherwise you will wear the screw threads. For a beginner, such a compound microscope as we have illustrated in fig. 1 should have two Huyghenian eyepieces, Nos. 2 and 4, one possessing a spider's thread cross. For objectives he will need 1", $\frac{2}{3}$" and $\frac{1}{6}$". Much later, he may acquire a $\frac{1}{12}$" objective, which magnifies (under suitable conditions) up to 1000 diameters, but this needs special technique.

One last word on microscopes in general. Always keep your microscope and everything connected therewith perfectly clean. Minute dust specks look alarmingly large when magnified even one hundred times! Lenses should be cleaned with a small, soft leather, kept specially for the purpose; do not try to clean the inner surfaces of lenses, or indeed to unscrew them at all, unless absolutely necessary, and always avoid anything which will scratch the surface. When first you get the instrument, take it to pieces (or have it taken to pieces for you), so that you may thoroughly understand its parts; but do not, I most strongly urge you, take it down again afterwards to show somebody else, or it will very soon get " out of true ". To prevent rusting, wipe over the brass parts occasionally—say once a year—with a film of oil, and then wipe the oil off. Some people keep their microscopes under a bell jar instead of in the more usual

box; this is an excellent way of keeping out dust and yet having the instrument ready when you want it.

For studying objects under the microscope you will need some accessories. These can be bought cheaply, as a rule, but one can spend up to any amount. First comes a gross of glass slips 3" × 1", in assorted thicknesses; they cost only a few shillings, but should be bought from a reputable maker, such as Stanley, C. Baker, or Clarksons. You will also need a few similar slips which have a shallow dishing in the middle, for holding water samples. Microscopic objects not only lie flat, but can be better viewed, when cover glasses are cemented over them. These can be purchased at the same shop; buy ⅝" or ¾" diameter, in small pill boxes holding half an ounce. Get No. 3 or No. 2 thickness to start with; later you can use No. 1, which is very thin and fragile. You will also need a few dissecting needles and knives, and a glass pipette for picking up fluids; for the latter purpose the filler of a fountain-pen will do, if quite clean. To cut thin sections of leaves, cork, &c., use a *new* safety-razor blade mounted in a holder; never use old blades, because they give a tearing cut and may ruin the specimen. A hollow-ground ordinary razor is better still.

Cutting specimens, by the way, is nearly the most difficult thing in microscopy, so that you cannot expect to learn much about it in a few lines. After a time one acquires skill enough to practise one's own methods. Here are one or two simple hints. Awkward subjects to hold can be dipped in a little melted wax, then cut when the wax is solid, and then melted out again. Sections across the stems of plants can be made, after some practice, fairly thin, by direct cuts with the razor. To cut a leaf transversely, it should be placed between two pieces of carrot or potato, and the cut made across all three; cut a number of sections, for not only are no two quite alike, but you are certain to make many false cuts, especially at first. The specimens should be washed in distilled water and then floated on to the slide.

The number of beautiful and singular things which can readily be obtained for microscopic examination is legion. It is, of course, essential that the piece selected should be small, ¼" or ⅜" across if it is some large subject such as a butterfly's wing, or the tiniest sprinkling if it be pollen grains or other interesting " dust ". After each use, clean the slide (or better still, use a new one), or you will see some truly strange things!

Moving objects naturally attract more attention from beginners than dead ones. Dip your pipette in the water of a vase that has held chrysanthemums, sunflowers, or other flowers which make the water smell if not changed after a day or two; seen under the microscope, such water is sure to yield minute animals and plants, some gaily "rowing" across the field of view by means of hairs that move too rapidly for you to notice them, others carried along in the circles and currents of the fluid. Most of these things are called Infusoria; public libraries generally have books upon them, under the name of "Pond Life". You can, indeed, do worse than take a test-tube, tied to a stick, down to the nearest weed-covered pond, and examine its contents under your microscope; but if the water sample is not used at once, leave the tube only half full, so that there is plenty of air available for the organisms to breathe.

Insects offer an inexhaustible source of amusement and instruction under the microscope. Take any moth, and wipe on the slide a little of the buff-coloured "dust" which comes only too readily off its wings; you will then find that this "dust" is really a multitude of beautiful scales, differently shaped in various species. Now place a piece of the wing under the glass, when you will see these scales overlapping like tiles on a house roof; they appear to have lost most of their colour, but by shutting off the transmitted light (which in a crude way may be done with your hand alone), they display a glorious medley of colours. Take a dead fly to pieces; note the extraordinary complexity of its many-faceted eyes, likewise, its skin, mouth parts, legs, and so on; at first you will make an awful mess of it, but skill will follow with practice. Wander through the garden, looking for the galls on oak-leaves, the minute saw-flies which bind such things as loganberry leaves together, the black flies on tomatoes, and other small pests; all are perfectly suitable objects for superficial examination. So with the insects that hide in the flower-heads of grasses, of which there are a great many different kinds.

In another Section ("Natural History Collecting"), we recommended that the dust left behind after cleaning seaweeds should be dried and saved; it will disclose to your astonished eyes lots of things the existence of which you had never dreamed of. There will be bits of dirty-looking brown "thread", which when magnified resolve themselves into chains of most beautiful little cells or chambers on a common stalk, the homes of Corallines or

Hydroid Polyps. There will be some very minute round or irregular, chalky or brilliantly polished shells, some like tiny Aladdin's lamps, others resembling strings of sausages dumped on one another, and perforated by very minute holes; these are Foraminifera, which abound in the ocean. There will almost certainly be moss-like growths on thin red seaweed strands; when enlarged they become glassy chambers, the homes of countless simple animals which took in their food through the oval holes, where the creature's mouth and tentacles once stuck out; these too are Corallines. We say nothing of the seaweeds themselves, or indeed of plant life generally, to the microscopic study of which whole books are devoted. Make a few sections here and there at random, until you find a subject which really fascinates you; then get a book which deals with it and study the subject *thoroughly*.

To make microscopic slides for permanent preservation is not too easy, and in some cases requires much knowledge and skill. You are therefore not advised to attempt it at first, except in the case of objects which require no special preparation. To make them transparent the majority of preparations must be fixed in some kind of fluid, commonly Canada Balsam; but others, such as spores of ferns, pollen grains. Foraminifera, thin dried sections of leaves, moss capsules, small insects intended only to be viewed externally, butterfly scales, &c., make excellent subjects if mounted dry, either on paper-covered slides (for dark-ground illumination), or in the ordinary way, according to the opacity of the subject. If they be very thin, all that you need is to carefully clean the slide and the cover glass, place the object on the former, and, after applying a *thin* continuous edging of cement to the rim of the cover glass, cautiously lower the latter on to the specimen and hold it down with a small wire clip. There are snags, of course, even in the simplest job of this kind. If you use too much cement, it will run in under the cover glass and spoil the specimen. If you are not careful, too, you will fail to make the cover glass clean without cracking or even breaking it. A good way for unskilful fingers is to take two corks, round each of which a strip of wash leather has been tightly fastened, place the cover glass between, and give it a circular motion with one's fingers; but in time one can handle even the thinnest cover glass between thumb and finger, and wipe it clean with the other hand.

If the subject is thick, you will need a cell. To make one is

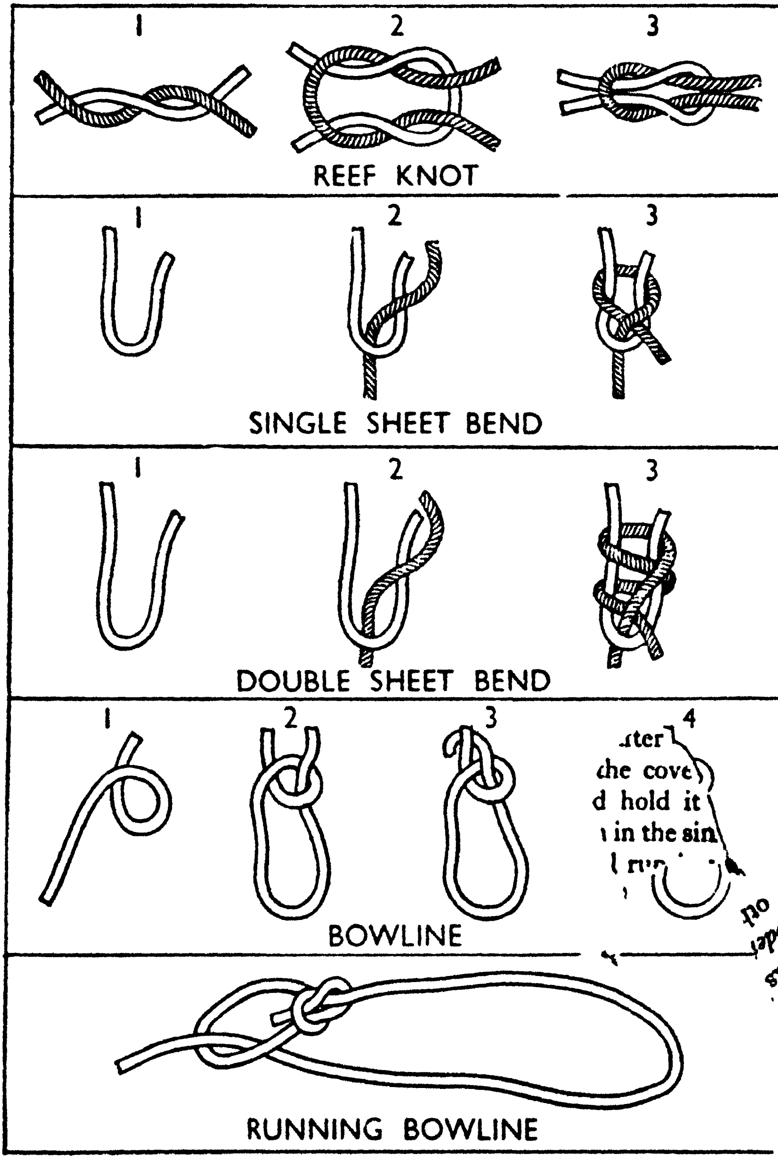
quite simple. Bone or metal rings are sold by microscope dealers in various thicknesses. The rings are cemented to the slide, the object not being inserted in the cell until the cement is quite dry; then the cover glass is cemented on top. One can also make quite good cells by building up rings of cement on the slide. For all such purposes a turntable—yet another accessory that can be purchased fairly cheaply from the instrument supplier—is essential if you want to do it properly. Of course, for thick objects in cells only lower powers of the microscope can be used; otherwise most of the object is out of focus.

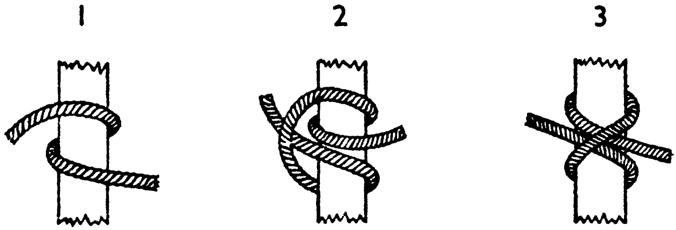
As to cements, many kinds are advocated by one microscopist or another. For general purposes good-quality fish glue is useful, but it is liable to crack with age. Old gold size that has been allowed to thicken through exposure is an excellent adhesive for cover glasses. Never use cheap liquid glues or you may have to make your slides all over again.

After the cover glass is dry, give its rim and the near part of the slide a neat circle of good cycle enamel, not too thick. Then store your slides, either flat in trays (taking care that their upper sides are clear of the next tray above), or vertically in boxes. Slide boxes are expensive at present, but a quite useful one can be made with any box of suitable size, round the inside edges of which corrugated paper is glued. Round or square linen-drapers' labels for naming the subject of the slide can be purchased at most stationers'.

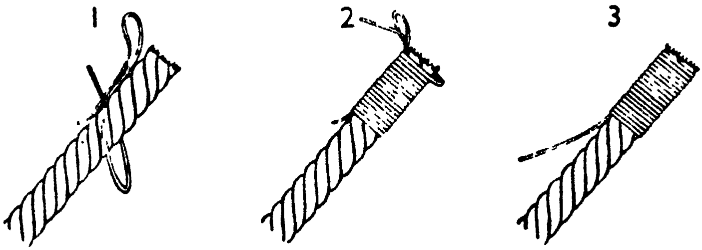
Finally, I imagine that with many of you what began as a mere hobby will end by becoming a serious study. For this you will require books and apparatus. An excellent little book for beginners is *The Modern Microscope*, by M. I. Cross and M. J. Cole; there are many others, of course, and for experts special manuals.

SOME SIMPLE KNOTS WHICH EXPLAIN THEMSELVES





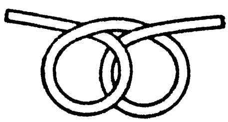
CLOVE HITCH

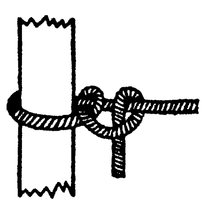


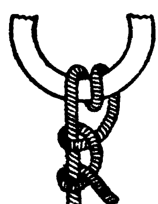
WHIPPING A ROPE'S END



CARRICK BEND


MOORING HITCH


TWO HALF HITCHES


ROUND TURN AND TWO HALF HITCHES

PUTTING ON A PLAY

Most people, for some reason or other, fairly early in their existence, feel that they would like to embark on some form of theatrical work. Why this should be I cannot say, but it is none the less a fact. The urge may be only to dress up or it may go to the length of putting on a play. In the latter case, it is well to know how to set about things, and the pitfalls of which you should beware. The play may be quite a small affair in your own drawing-room, and the audience may be your family and friends. It may, on the other hand, be on a bigger scale in some local hall. In either case the same principles apply.

The first problem that will arise will be what play to perform. Well, you have a wide choice, and your final decision will depend on your own taste. But generally speaking, it is wise to start with a play that has a strong plot—that is to say, a good story. It may be either comedy or drama, but, oddly enough, comedy is on the whole more difficult, and if you try it you should certainly avoid the very sophisticated drawing-room comedy, which is hard for amateurs of any age.

The characters in the play must suit reasonably well those who are going to take part. Messrs. Samuel French, Ltd., who publish acting versions of many thousands of plays, also publish a *Guide to Selecting Plays* which is very useful. The Guide gives a short synopsis of the plot and the types of characters required.

It is a good idea to start with a one-act play. It is easier for all concerned, and if you wish to give a full evening's entertainment, it is easier to do three or even four one-act plays than a full-length play. This is because it is easier for the actors to master a character that has to be maintained for only a short time, and it is easier for the producer to map out the moves and generally appreciate a short play where there is one central idea and one scene. If you have a lot of people who wish to act, there will be more good parts available if you do several short plays.

You may have thought of writing a play yourself. A good idea, because there is no better way of learning the technique of play-

writing than by producing your first plays in a small way yourself. But do not on any account start with one of your own plays Get your experience of acting and production first of all with a play that has been tried and proved. Unless you do this, if things go wrong you will never know whether the fault lies in the production or in the actual writing of the play itself. Playwriting is really not a thing that can be taught, although there are several books on the subject, the standard one being Archer's *Playmaking*. To be a successful writer for the stage you must, unless you are a genius, get to know the theatre. There is no better way to start than by producing a play yourself.

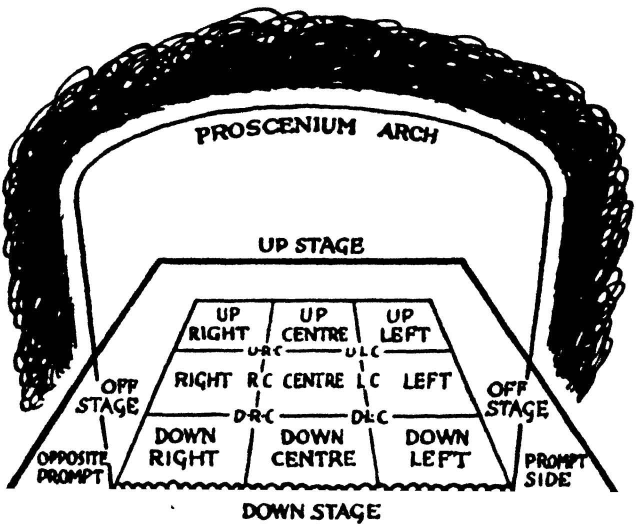
Having decided on your play, you must next decide who is going to produce it. The producer is a very important person indeed. It is he who interprets the author's ideas and gives them life. That is to say, he decides how the actors will move, how they will speak their lines, how the scenery shall be designed, where the furniture shall be placed, what sort of furniture it shall be, and so on. In short, he—or she—is in charge of the play until the first performance takes place.

If you can find someone with experience to do this for you, so much the better. If not, and you decide to do it yourself, do not be discouraged. You will make mistakes, of course, and you will come up against many snags, but if you have to sort all this out for yourself you will have learned a lot from your first production. Incidentally, if you go on producing for the rest of your life you will find that you always encounter snags. Your experience, as you go on, will enable you to deal quickly with those you have met before, but fresh ones always appear. No two plays are the same, and neither are the problems they bring with them. It is one of the charms of the theatre that with each production you start afresh with something entirely new. The mastering of fresh problems is a challenge to your ingenuity. If you are anxious to take up the challenge, and if you are alert and have an agile brain, you will always win the battle.

Well then, you have decided on your play, and you have decided to produce it yourself. Your work now falls into two compartments. In the first there is the working out of the play itself and coaching the actors so that they give the sort of performances you wish. In the second there is the material side of the production: the staging, lighting, effects, and all the very necessary things which the audience

does not see, but which are essential to the success of the play. The two are not really separate. They overlap. Each obviously affects the other, but it is convenient to deal with them separately here so as to avoid confusion.

You must first of all decide the character and shape of your setting. If your scene is an interior—a room—you must decide where the doors, windows, and fireplace are to be. If you are having the set specially designed, you must at this stage consult the de-



Stage areas

signer and ensure that your ideas are practical and in conformity with the general design of the setting. If, as is more probable, you are going to hire a set, then you must see the firm from whom you are getting it and make sure that you can have the practicabilities (doors, windows, &c.) you want, with the scenery that is available.

Having fixed the set itself, you must then decide on what furniture you require, and where it is to be placed. Again, you must bear in mind what furniture you are likely to be able to get.

The next step is to make a scaled plan of the set, showing the positions of all the furniture, and therefore also showing you what room is left for the characters to move about. The easiest way to do this is to get hold of some squared paper, such as is used for

mathematics and science at school, ruled in squares of one inch and one-tenth of an inch. A convenient scale is half an inch to the foot. Then, with your ground plan in front of you, read the play carefully through and mark in pencil on the script (the typed or printed copy of the play) whenever you wish a character to move, and the point to which he or she is to move. At this stage do not worry about small moves such as gestures of the hands or turns of the body, but confine yourself to those that alter the positions of the characters on the stage, including when they seat themselves and when they rise. All the time you are doing this you must visualize the play taking place. You may find that it helps if you use bits of matchstick or small pieces of paper to represent the various characters, and move them on your ground plan as you mark up the moves on the script. But if you do this, remember that whatever it is you use to represent the characters, they are not likely to be to scale.

Avoid making aimless moves. If you wish a character to cross the stage, he must have some reason for doing so, and you may have to invent this. Avoid "fussy" and unnecessary moves, but, on the other hand, do not let the play become too static or it will be dull to watch. All the movements must arise naturally out of the situations in the play, and must appear quite natural, even inevitable, to the audience. At this stage, when you are only preparing the play in general outline, it is almost inevitable that you will put in moves that have to be altered later during rehearsal, so it is wise not to go into great detail but rather to outline the movements broadly. It is a good thing to go to the first rehearsal with your ideas for the play clean cut in your own mind, but a bad thing to force the production to fit these preconceived ideas, if when you come to rehearse, you find, or someone else suggests, a better way of doing things. In short, you must know what you want, but you must keep an open mind on how to achieve it.

This brings us to the actors. Who are you going to have to play the various parts? Obviously it is better to have people who are keen to do it. If your cast (the actors and actresses) have to be overpersuaded to take part, you have a very slender hold over them and they may let you down at the last minute. They may become very keen as the rehearsals progress, but they may not. They may find that the time given to rehearsals interferes with other activities in which they are more interested. So, try to get people who are as interested in the idea as you are yourself. If they have never acted

before, you will have to take a chance in your first play as to whether they can act or not. If they are keen and sincere, they will probably put up a good show. It is worth remembering that the converse does not necessarily hold good. I have known extremely good actors who hated acting.

It is as well to make it clear to the cast that from the time you start rehearsals until your play is produced they are going to have to devote most of their spare time to rehearsing and studying their parts. A lot of rehearsals are bound to be necessary, and the less experienced your actors are the more rehearsing they will require. The intensity of rehearsals naturally depends on the period over which you spread them. You may decide to keep them going over the winter months, rehearsing once a week, with more frequent rehearsals when you get near the production date. This is often done. You may rehearse over half the period twice a week, which is better. Or you may rehearse every evening for three or four weeks, which is best of all—but not always practicable. With beginners it is not a bad idea to rehearse only twice a week at the outset, because it gives the actors longer to learn their parts.

As regards learning parts, people vary very much. Some learn them quickly and easily. Others take a long time. But it is surprising how the part comes to you once you start rehearsing. Never let the cast learn their parts before you start rehearsing. In the long run this saves no time. Remember, they have to memorize not only the lines, but also the moves. Once you start rehearsing, and the moves are marked in their scripts, they will automatically learn the two together. If the words are learned first, you will find that the moves come less easily. You may think that this is a small point, but it is one on which you must be firm.

As a producer you must, of course, be firm all the time. You must establish your authority at once, and make it quite clear that what you say goes! This applies to everything connected with the play. A successful production must be a dictatorship and cannot be run on democratic lines. On the other hand, if you are wise you will be tactful. Don't appear to be "bossy". This irritates people and causes friction. Don't allow arguments. If an actor, or anyone else, for that matter, has a suggestion to make, welcome it. Don't discard a good idea simply because you didn't think of it yourself. You will find that everyone has something to contribute, and that it is the sum of these good ideas that makes a good pro-

duction, if you control it. Weigh, therefore, every suggestion, and if it is a good one, adopt it. But avoid discussions that become general.

There must be discipline at rehearsals. People must turn up at the right time, and not five minutes late. That, after all, is only ordinary courtesy. The cast must not be allowed to whisper in corners while others are rehearsing. Obviously this is distracting for those who are working.

Whenever you give an actor a move, see that he marks it in pencil on his script and that, at the same time, it is marked in the " prompt copy ". The latter is most important, because the prompt copy is your bible, and must be the final arbiter in any argument. Marking up moves takes a lot of time at the early rehearsals. You may find this irritating and feel that time is being wasted. But that is not so. In the long run, time is being saved. Few people can remember accurately all the moves that are given. If scripts are not marked at the time, there is a grave danger of prolonged argument, particularly if rehearsals are at weekly intervals. In addition to wasting time, such arguments fray tempers and detract from the general smooth running of the production.

Don't take the scripts away from the cast too soon. The actors must, of course, have their scripts until all the moves are finally fixed and parts are memorized. But if you feel it is going to give them confidence, leave the scripts until you are giving gestures and paying attention to individual performances. By that time scripts are a nuisance and parts should have been memorized.

It is better not to ask an actor to copy a gesture or an inflexion which you give him. Rather, try to describe to him the impression you wish him to convey. The reason for this is that no two people ever react in exactly the same way, and an actor may give a perfect imitation of a line spoken by you which sounds stilted and out of key with the rest of his performance.

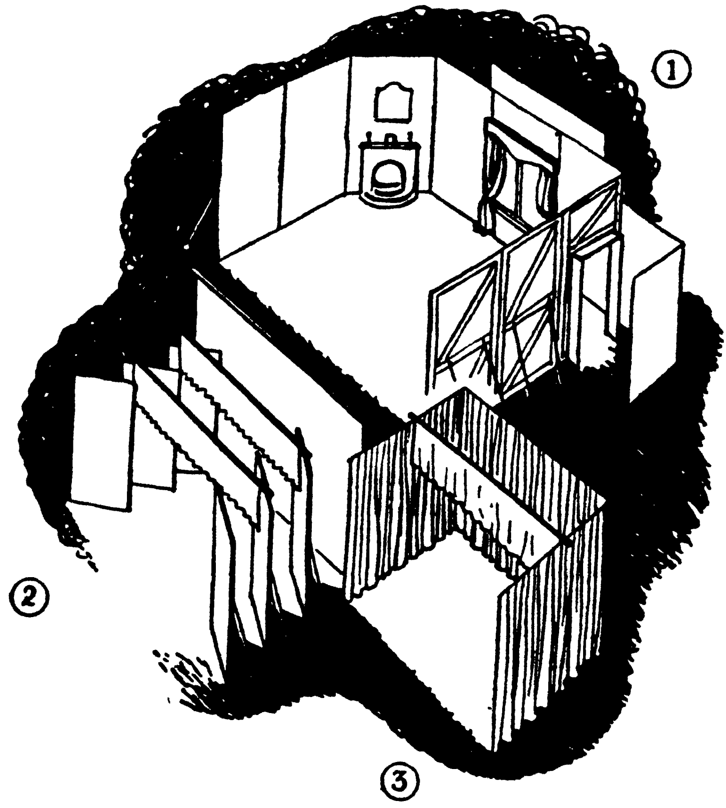
Pace in the production is most important. Not necessarily speed. But pace suited to the rhythm of the play, quickening towards the climaxes. Start to get this whenever you have got rid of the scripts. Beginners tend to " hang on cues ". This means that instead of answering the previous speaker immediately, there is a split second's delay before the reply. This must be avoided. During the performance, when the audience laugh you must wait until the laugh is dying before you speak, otherwise your line will not be

heard. But pausing for laughs can only be thoroughly learned by experience, and laughs do not always come where you expect them, nor always even in the same place at different performances of the same play. Definite pauses for effect must be marked in the prompt copy, so that if in an emergency you have a strange prompter, who does not know the play, he does not prompt in the wrong place. One word about prompters. Remember that when a line is given it must be heard by the actor who requires it. It is better that the audience should hear the line also, than that the actor should not hear it. Prompting is a difficult art. Some people are naturally good prompters. Others are never able to prompt successfully. On the whole, women are better prompters than men, probably because of the quality of their voices.

One final word about production. If you are producing, do not play a part yourself. It is perfectly true that you can point to many cases where famous actors also produced the plays in which they played leading parts. But wait until you are a famous actor before you try this. Even then the wisdom of it is questionable.

And now for the second compartment of which I spoke. So far we have only considered the coaching of the actors in their parts. But there is a great deal more than that, and for these other things you should have various people to help you. First of all, you must have a stage manager. He is your second-in-command. He has authority over all the departments of the production second only to your own. He will control all that goes on upon the stage during the performance. He will arrange with you the scenery, the lighting, and the costumes. He will see that the effects take place at the right time, and that there is always someone there to prompt. He will supervise all the changes of scenery. He will also see that all the properties are there when they are wanted. (Incidentally, properties that are handled by the actors should be used at rehearsals as soon as possible.) He will be extremely busy. As he cannot satisfactorily do all this himself, he will have at least one assistant, called, for short, the A.S.M. Either the stage manager or the A.S.M. should be at every rehearsal. It is they who keep a note of the moves and mark up the prompt copy, and later, when the actors have got rid of their scripts, prompt the play. One or other will prompt the play at the performance—usually the A.S.M., although they may share this task. But the prompter must in any case be someone who has attended rehearsals and knows the play.

You will probably not design and make your own scenery, but you will naturally make every effort to have the sort of scenery you want, probably by hiring it, but perhaps by having something very simple that you can knock together yourselves. Bear in mind the



Stage sets

. Box set. 2. Wing and cloth set. 3. Curtain set

possibility of using draperies. Curtains can make very effective settings. For some plays they are better than flats, as the canvas-covered wooden frames that form the units of normal scenery are called. If you are producing the play in your own house, then draperies are probably the best solution. You should, of course, use the same curtains to surround the whole set, and they should

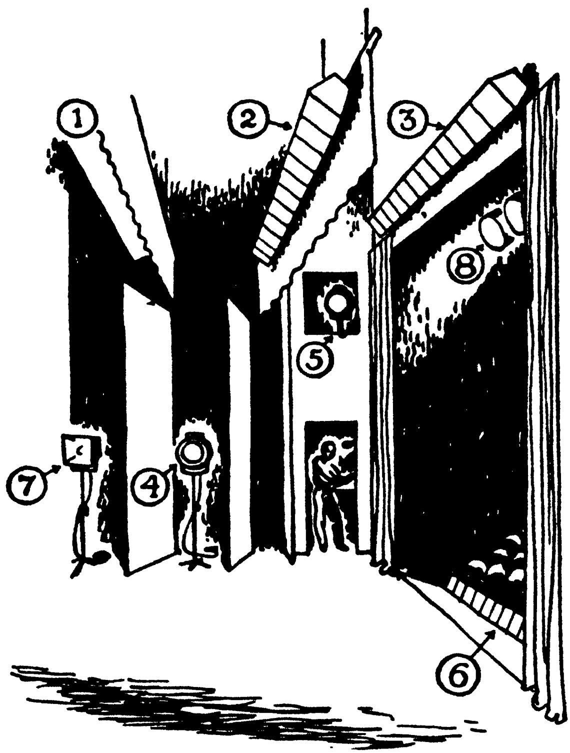
hang in folds and not be stretched taut. If you are depicting an ordinary room, flats containing doors, windows, or fireplace may be used along with the curtains, and these flats can be moved about to indicate a change of scene. This is a convention, but one which the audience will accept.

If you have not got a stage, you should try at least to raise a little the area on which the actors play. A foot would probably be enough in an ordinary drawing-room. This will involve some carpentry, but nothing that is very advanced. You may even be able to borrow the timber and send it back afterwards, if you do not make too many nail holes. It is, of course, much easier if the stage is there already, and if you play in a hall it will be.

The stage manager must, as soon as possible, make a list of the properties required for the play, and set about getting them. Properties contribute enormously to the appearance of a production. They can give the audience the impression of the sort of room in which the play is taking place, and of the people who live in it. The simpler your scenery has to be, the more you should concentrate on getting the right kind of furniture and properties. There are always certain things that the actors handle, or that, although not handled, are mentioned in the play. These you will get as a matter of course. But you must get many other things that are not mentioned. These other properties are called stage dressing, and it is this stage dressing that stamps the character of the set. There are a great many plays that take place in ordinary middle-class living-rooms. If you are doing one of these and the audience sees only the properties that are mentioned in the script, the room will almost certainly look bare. The odds and ends that are always lying about in such a room, the ornaments, the papers, and so on, will all be missed. The stage manager should make a list of what is required, and go round his friends, borrowing what he can. As he must obviously start to do this a long time before you are going to perform the play, he should note against each article where he is going to get it, and arrange for its collection later.

The stage manager must also make out what is called a " property plot ", showing the position of all the " props " on the stage, with a list of those required off for actors to take on. He should also add a list of what are called " personal props ". These are things like cigarette cases, matches, handkerchiefs, &c., with which actors have what is called " business ", and which they carry on their persons.

The actors themselves are responsible for these, but a wise stage manager will make sure that they have them before they go on the stage. All props should be checked by this list before each performance.



Stage lighting

1, 2, 3. Battens. 4, 5. Spots. 6. Foot. 7. Flood. 8. F.O.H. (Front of house) spots.

The lighting of the stage is a study in itself, and a very fascinating one. There are many excellent books on this subject. If you have electric light in your house, it is quite a simple matter to rig up footlights with a flex and plug, to plug into one of the lighting points in the room. But you should consult an electrician to make sure that you do not overload the circuit and fuse the lights or perhaps cause a fire. You can buy bulbs and holders and screw the latter on to a light wooden batten. You should, if you can, have

three circuits wired in parallel, each third lamp being on the same circuit, and being operated by the same switch. You can use old cocoa tins for reflectors, and buy coloured gelatine to put in front of the light. Remember that the audience must not see any naked light. The reflector must conceal the bulb from them. If you have one colour of gelatine per circuit, and can make or hire dimmers so that each circuit is on a dimmer, then you can get a great variety of light. This all sounds very complicated, but it is quite possible to achieve in a drawing-room if you take a little expert advice and consult one of the books on the subject. You must also have at least one batten which is similar in all respects to the footlights, but hangs from above, being hidden from the audience by a cloth border of some kind.

In the absence of electric light you may have to make do with oil lamps or whatever lighting is available, but the same principles apply. Remember that you can always produce effective stage lighting by using car batteries and lamps of the appropriate voltage. If you do this you must make sure that the batteries are sufficiently charged to last out the performance.

Generally speaking, it is wiser to use gelatines of soft colours. Pale pink gives a warm light, and is good for costumes. Amber gives a sunny effect, and steel blue a cold one.

Stage lighting is unnatural, and casts unnatural shadows on the actors' faces, which must therefore be made up with grease paint. There are various makes of grease paint, sold usually in sticks, numbered according to the colour. The most generally used colours are 5, a yellowish flesh tint, and 9, a reddish flesh tint. The two combined, rubbed on the face, will produce the groundwork necessary for most characters. Older people are usually sallower, therefore you would use more 5 than 9 if you were making up as an elderly man. If you were supposed to be a particularly healthy, wind-blown young sailor, then you might use only 9, using carmine to give the redder colour on and above the cheek bones. You would normally use 9 for that purpose, with a 5 and 9 make-up. The eyes should be outlined with a very narrow line of blue or brown, according to their colour, to make them stand out. Lines on the face are shown by using grease paint liner of a dark shade—brown or dark red—but remember that each line must have the corresponding high light in a light colour (white in the case of a pale make-up) alongside it. It is the high light and shadow together that produces the

effect. The one without the other is useless. Try to put your lines where they will eventually come as you grow older, and with your finger blend them into the groundwork of your make-up. Your eyebrows should also be darkened. After you have made up you must powder thoroughly with blending powder, to fix the make-up and prevent the skin glistening. For moustaches and beards you can buy crêpe hair, which is stuck to the face with spirit gum. If you require a wig, the only satisfactory thing is to hire it—and make sure that it fits you.

Remember that you will wish to remove the make-up after the performance! To do this simply rub threatrical cold cream over the face and wipe off with a towel, cotton-wool, or face tissues. On no account attempt to wash before you have removed your make-up.

There are many books on the various subjects I have mentioned, specially written for amateurs. I have mentioned one or two, but there are many others, including a very comprehensive work called *Theatre and Stage* edited by Harold Downs. This is in two large volumes, but it contains all you are likely to wish to know about every aspect of putting on a play.

I hope I have not made the business of play production sound too complicated. It is certainly not easy to achieve perfection, but then it rarely is in anything that is worth while. The golden rule is to refuse to be discouraged. Go ahead! You will be surprised how good the result will be.

STAMP COLLECTING

Stamp collecting is a fascinating and tantalizing hobby; for it matters little whether you have thousands of pounds to spend on it, or merely coppers—there are stamps to be collected by people of all tastes and with pockets of all depths. That is why it is as popular with millionaires and kings as with so many ordinary folk like ourselves.

If you collect for a lifetime you will probably never come into possession of any of the very early stamps of British Guiana, or of the penny and twopenny stamps issued by Mauritius in 1847; but there is just as much fun in hunting for a perfect copy of the Great Britain penny black, or in completing sets of the many fine pictorial stamps to be found in various issues of so many foreign countries.

In passing, you may be interested to know that one of the British Guiana stamps is the rarest stamp in the world. This is the 1 cent stamp issued in 1856. It is not the earliest stamp of this particular colony—the first was issued six years before—but it has become valuable because only one known copy has survived. At the present time this is in an American collection and is valued at £10,000. The owner gave £7343 for it several years ago, and not long afterwards refused £7500 for it. One of the most interesting things about this stamp, however, is that it was once in the collection of a schoolboy. This particular boy was Vernon Vaughan, of British Guiana, and he discovered the stamp on an old envelope in his father's attic. He stuck it in his collection but liked it so little—for it is really only a dirty scrap of paper—that he sold it to a dealer for six shillings. Later it changed hands for £25 and so started on its road to fame.

The early stamps of Mauritius have a history almost as romantic. Only thirty of the first two are now known to exist, and all are in well-known collections. At one time they were bought and sold at about £4 apiece, but now it would take nearly as many thousands to buy one. One of the stamps which King George V prized most was a *2d.* Mauritius added to his collection in 1904. It cost £1400 then, but is probably worth nearer three times this amount now.

Although it is not wise to stress the commercial side of stamp

collecting too much—for I, like many others, believe that one should collect for the sheer joy of collecting and not with an eye always set on eventual profit—the fact cannot be overlooked that this is an advantage which stamp collecting has over almost every other hobby. If you collect wisely you not only have the pleasure of collecting, but you find, as the years go by, that you have something appreciating in value and worth more than the money (however much or however little) which you have spent on it.

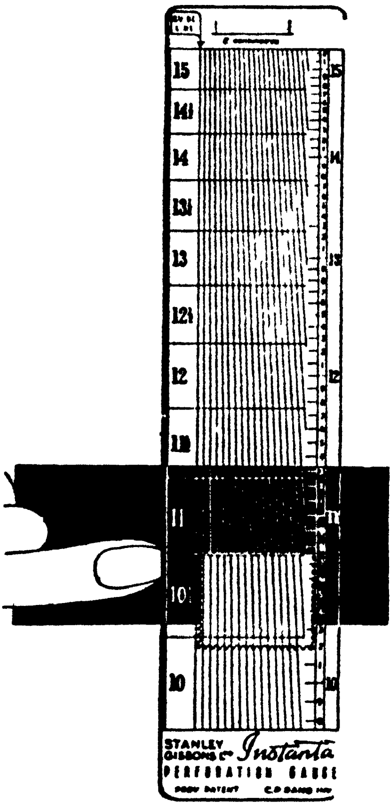
I have said *if you collect wisely*, and one of the first things I want to emphasize, if you are taking up stamp collecting seriously, is that you *should* collect wisely. But more about this later. In the meantime, let us see what is required, in the way of accessories, before one can start collecting at all. Fortunately, the requirements are not large and the expense is comparatively small.

The very first requirement is a pair of tweezers, and I have put these first because you cannot handle stamps too carefully. If you handle them too often with your bare fingers they begin to get grubby, and, if you are not very careful, it is not long either before they start to show creases or lose a few of their perforations. Stamps which are not perfect are little better than useless scraps of paper. The serious collector—and if you are going to be a collector at all, please do be a serious one—will have nothing to do with stamps which are not perfect in every respect. Your collection will look very ordinary if you half fill it with a lot of damaged and dirty specimens. It is much better to have half the number and have them looking bright and undamaged. So to begin with get a pair of tweezers. A shilling will buy a good pair at any stamp shop, or you can get a pair of nail tweezers from any chemist.

Next, I would advise you to try to get a new or second-hand stock book in which to put your stamps until you are able to mount them up, and a small stock card in which to carry " swaps " in your pocket. Stock books or stock cards are made up of pieces of card across which strips of paper are pasted at reasonable intervals. These strips are pasted only half their depth, so that stamps can be slipped in between the unfastened portion and the back of the card. They are quite easy to make yourself, since all you require is a few sheets of cardboard, some strips of brown paper and a pot of paste.

Three other useful accessories are a perforation gauge, a watermark detector and a magnifying-glass. The latter is the least important of the three and need not be purchased straight away.

The perforation gauge is very important, and you will be able to get a good one from any stamp shop for a few coppers. Buy as good a one as you can afford, since the very cheap ones are not always accurate and they are often difficult to read.



A transparent perforation gauge
(Reproduced by permission of Messrs. Stanley Gibbons, Ltd.)

You may wonder why this gauge is so important, and it may be advisable, at this point, to explain its working to you.

The early stamps of a good many countries were not perforated at all. They were simply printed in large sheets, with small spaces between each stamp, and when the stamps were sold or used they were cut out of the sheets with scissors. In 1854, however, this country adopted a perforation patent brought out by a certain Mr. Archer, and from then on stamps were perforated so that they could be removed easily from sheets and without resorting to the tiresome business of cutting them.

Throughout the years all countries have varied the perforations of their stamps considerably, and a gauge shows to which of these variations a particular stamp belongs. When you get a gauge you will probably find that it is numbered from 7 to 16½, and the figures represent the number of perforations in each 2 cm. space of the stamp. This 2 cm. is a standard on which every gauge is spaced. In order to find the perforation of a particular stamp, therefore, all you have to do is to place it on the gauge and move it until the perforation fits one of the numbered lines on the scale. The figure against the line is then the number of the perforation.

In passing, it is interesting to note that a perforation will sometimes increase the value of a stamp considerably. Take, for example, the 1½*d*. George V stamp issued by St. Lucia in 1936. You can have two copies of this stamp and both will look alike. When you test them on the perforation gauge, however, one may measure 14 on all sides while the other measures 12 on one side and 13 on the other. If you have one with the latter perforations you are lucky, since this is worth about twelve times the price of the former. Or you may have two copies of the 6*d*. deep orange issued by New South Wales in 1905. One is perforated 12 by 11½, where the other is perforated 11 all round. The value of the latter is over two hundred times that of the former.

A watermark detector reveals differences equally as interesting. You will know, of course, what a watermark is, and you may have seen one in all good-quality notepaper. The majority of stamps have been given a watermark in order to make it more difficult to forge them. Often you can see it by holding the stamp up to the light or holding it, face down, a few inches from something black. When the printing of the design is very dense, however, or the paper used is rather thick, it is not at all easy to pick the watermark out properly. It is then that a watermark detector comes in useful. Actually it is only a shallow black tin and its cost is seldom more than a shilling. Used stamps can be soaked in water and laid flat down in the tin, when the watermark will show up clearly. Obviously you cannot do this with unused stamps or you will spoil the gum and thus ruin the stamp. In their case, however, you can put them face downwards in the tin and pour a few drops of benzine on them. Stamp dealers sell special dropper bottles for this purpose, and these can usually be purchased for about eighteenpence or two shillings.

Just as perforations vary considerably, so do watermarks. They take the form of designs or letters—sometimes both. The most common of the Great Britain and British Colonial watermarks is a crown with the letters CA above or below it. The CA may take the form of ordinary capital letters, or of script letters—*CA*. Sometimes the letters CC are found instead of CA. The watermark of some stamps is just one crown and one set of letters. Of others it is parts of more than one crown and more than one set of letters. In these cases it is described as being " multiple crown CA " or " multiple script CA ". In the majority of stamps the watermark

is upright, but in a few it is found sideways. " CA ", by the way, means " Crown Agents ", the government department responsible for such stamps.

Stamps are often exactly alike in appearance but differ in watermark, and when this is the case one is almost invariably worth more than the other. Take, for example, some of the values issued in 1922–7 by Gambia. The 1*s*. purple-yellow may be found either with an ordinary CA or with a script CA. The latter is worth only about half the former. Again, the 5*s*. green-yellow of the same issue differs in the same way, but here again the ordinary CA is worth about twice as much as the other. You can see, therefore, how essential it is to be able to detect the watermarks of your stamps in order to place them correctly.

The next thing you require is a good catalogue, and you cannot do better here than get one of those published by Messrs. Stanley Gibbons. There are other catalogues of almost equal merit, but the Gibbons catalogue is recognized by almost every person who collects stamps, or who deals in them, and whenever you see a number attached to a stamp as a reference, preceded by the letters " S.G.", you can be certain it is the number of that stamp in the Gibbons catalogue.

The general catalogues are brought up to date every year and are published in two parts—Part I being stamps of the British Empire and Part II those of Foreign Countries. If you cannot afford to buy new catalogues, and cannot persuade a friend to buy them for you, you can sometimes pick up good copies on second-hand bookstalls. Or frequently one may borrow the latest issue from the Public Library.

A catalogue lists all the known stamps and gives prices at which Messrs. Stanley Gibbons are prepared to sell them if they have them in stock. These prices give a very fair idea of current values, and if you set out to do much buying you should try to buy as much below these prices as possible. Sometimes, of course, current prices are above those in the catalogue, since a catalogue goes to press some months before it is issued. Generally speaking, however, these fluctuating prices usually apply to recent issues or popular commemorative issues only.

Having acquired tweezers, stock books, perforation gauge, watermark detector and catalogue, you are now ready to start collecting seriously; and the last consideration is a suitable album and

hinges with which to mount the stamps. The latter can be obtained from any stationer's shop, and a thousand cost no more than 1*s.* 6*d.* to 2*s.* Always, however, get the very best you can. A good hinge will keep a stamp tightly fixed to an album leaf but will peel off both stamp and leaf, if required, and leave hardly any mark. Cheap hinges stick well--far too well, in fact—but when you try to pull them off they either refuse to budge altogether or do some irretrievable damage in the process.

Regarding albums, there are scores of different types on the market, but they all fall roughly into three main groups.

The first is the printed album. This is bound tight in book form, and the countries are arranged in alphabetical order. Pictures of many of the stamps are featured, and the various pages are ruled off to accommodate stamps in the order in which they appear in the catalogue. The second is also a printed album, bound tight, but in this case the pages are ruled off in squares and pictures of stamps appear only at the top, together with the name of the country. Both kinds of album are useful, and they certainly help in the arrangement of the stamps. They are, however, more for the lazy collector and give no scope for individuality. Moreover, they possess the one great disadvantage that if a page is spoilt it cannot be taken out without upsetting the whole album.

By far the best idea is to use loose-leaf albums. These are made up of plain loose leaves—plain, that is, except for a very faint ruling into tiny squares to make mounting accurate—which are housed in a stiff covered binder. The advantages of an album such as this are many. You can, for example, work on each leaf separately, and as your collection grows you can keep re-arranging the leaves to suit your convenience. If you spoil a leaf you can easily separate it from the rest of the album without in any way spoiling the collection as a whole.

What to my mind, however, is a bigger advantage is that you can " write up a collection " properly, and my own experience has been that this writing-up business is more than half the fun of collecting.

A collection seldom looks attractive when every page is the same —just covered with stamps all in rows and about the same distances apart. By using loose leaves you can vary the appearance considerably. Some pages will have several stamps on them; others may have only two or three. On some pages a few of your best specimens

will be arranged neatly in the centre; on others a whole set will perhaps be spread out to fill the complete page. You can make the stamps on different pages form scores of attractive designs, and the more you vary the layouts the more attractive will the whole collection become.

A generous use of black Indian ink (if you are using white leaves), or of white Indian ink (if you are using black leaves), will help to make your stamps stand out and give the pages an attractive appearance. Ruled, as they are, into small squares, there is practically no limit to the way in which the different pages can be varied. You can, for example, draw one, two, or three lines around a stamp and thus make it appear in a frame. You can join one frame to another; you can vary the thicknesses of the lines; and so on. For your best stamps you can make a black background on which to mount them. First of all fix the position and then paint the leaf black, with Indian ink and a fine brush, over an area a little larger than the stamp. Then mount the stamp in the centre. This always looks effective. Another attractive method of framing is to paint a line all round the stamp, the thickness of a square and one square away from each side.

Using a brush, you may get a few untidy edges, but if you are careful these are not serious, and if you afterwards line them all out with a pen you will soon obtain a very neat finish indeed. To begin with, take a few old leaves and experiment. Work out a number of different layouts, and when you are satisfied incorporate them into your collection proper.

This, however, is only a part of writing up. To make your collection really interesting you should add a few notes regarding the stamps on each page. Above each stamp, for example, write the catalogue number, and if the stamp is a pictorial one write below it the subject of the design. If there is anything especially interesting about a particular stamp add that also. For example, you may have a stamp with a First Day postmark—that is, the first day of issue—or you may have one containing an error, or one with an uncommon perforation. All these points are worth noting.

There are quite a few stamps, by the way, with minor errors, and these are always worth looking for. There is a big thrill when you find one unexpectedly, and it is in this connexion that a magnifying-glass comes in handy, for it enables you to study a stamp more easily. One fairly common error to look for is on the 1 cent green stamp issued by Newfoundland in 1910. Now and then you

may find the stamp with an F instead of an E in NEWFOUNDLAND. Such a stamp is worth nearly fifty times as much as the ordinary one. In the Hong Kong Jubilee stamps of 1891 there are several minor errors—such as a short J or a short U in JUBILEE—and all such stamps are worth two or three times the price of the ordinary stamp. Another example is found in the 1936 issue of Turkish stamps. These were the same as stamps issued in 1929 and 1930, except that they were surcharged with some wording, and the date 20/7/1936. On some of the stamps the date is 1926, instead of 1936, and these are catalogued at about twenty times as much as the normal ones.

One other piece of information to put on each page is the year of issue and details of the watermark and perforation. The best place for this is in the top left-hand corner, just below where the ruling begins.

We have covered now all the preliminaries connected with collecting and are ready to get down seriously to the business of collecting itself. There are two things you will want to consider here. The first is what to collect, and the second is how and where to obtain specimens.

In connection with the first—what to collect—you have probably answered, "Why, obviously, stamps!" But it is not as simple as that, and few worthwhile collections have been built up by collectors who have just collected anything and everything in the stamp line. Neither do you often find such a collector remain keen for very long. The reason for this is not far to seek. There are so many hundreds of thousands of stamps issued that, if you collect generally, you have nothing but gaps all over the album. Moreover, you never seem to complete anything.

If you are starting to collect, make up your mind to confine your attention, for the time being, to certain sections. You can, for example, collect only Great Britain, or only British Colonials, or only Foreign. A better plan, however, is to pick out a dozen or two popular countries and concentrate on these. Build them up as far as you can, and when you find it increasingly difficult to fill spaces —because the stamps are either too scarce or too expensive—start on another dozen or so. You can still fill up your main collections as opportunities present themselves.

For your guidance, here are what I consider the twelve most attractive countries among British Colonials, and the twelve most attractive among Foreign.

Among Colonials, then, I would suggest Bahamas, Barbados (from 1875 onwards), Cayman Islands, Cyprus, Egypt, Gold Coast, Hong Kong, Kenya, Leeward Islands, Malta, St. Lucia and South Africa.

My selection of Foreign is Belgium, Czechoslovakia, Denmark, France, Germany, Holland, Italy, Jugoslavia, Poland, Portugal, Spain and Switzerland.

I have selected all these with care as being countries in which it is possible to build up a fairly extensive collection quite cheaply and one which, when built up, should be very attractive to look through. Also, it is not difficult to place the various stamps in the correct issues and catalogue numbers.

Except of the very cheap stamps—say those catalogued under sixpence—do not hesitate to collect more than one copy, provided the copies are all perfect. When you come across pairs, or strips (more than two in a row), or blocks (four or more all together), do not separate the stamps but mount the piece as it is. Pairs, strips and blocks, particularly of some issues, are generally worth a little more than separated stamps. Apart from this, however, if they are dotted about a collection they give it a better appearance than if the collection is made up of all single stamps.

Some collectors confine themselves to the collecting either of all mint stamps or all used. There is something to be said for this practice, but there is no reason why a beginner should not collect both and then decide later on whether he will carry on with both or confine his collecting to one or the other. If you do collect both, however, try not to mix them up in the different sets. Get together a set of all used, or of all mint. If you can get a set of each, so much the better. Sets are more attractive if they are not mixed but, apart from this, they are easier to dispose of, if you ever wish to part with them, and they are invariably worth more.

I advised you earlier on to collect none but perfect stamps and referred then to those which are perforated. When you start to collect the earlier issues—and there is no reason why you should not start straight away—you will not find it at all easy to get perfect copies. In fact, they are very few and far between. You may like to know, however, that a good early copy is one that has been so cut that four margins of white show clearly all round the stamp. Do not despise those with only one, two or three borders, but remember that, as a general rule, those with the most borders, and the

widest borders, are the best –and therefore most valuable—stamps.

Having now made up your mind what you intend to collect, you can begin to build up your collection, and if you are going to set about this in the right way there are many points to consider.

Stamps one requires can be acquired in one or more of three different ways. Some you can get from friends for nothing, some you can obtain by exchanging unwanted duplicates, and others you will have to purchase.

Never be afraid to talk about stamps whenever you get the chance. Almost everyone in these days gets stamps at different times, chiefly by correspondence. Let all your friends know that you collect and many of them will be only too pleased to save for you all the colonial and foreign stamps that come their way. Whether you require them or not for your own collection matters little. You can always exchange unwanted ones with your collecting friends.

Try to find out who collects stamps in your town or district, and then endeavour to get an introduction to these people. Stamp collectors, as a body, are a very nice set of people, and nine times out of ten an advanced collector is always pleased to see the album of a beginner and more often than not is willing to give him a few of his own unwanted duplicates.

You can get to know a wide circle of collectors by joining a Philatelic Society. There is one of these in most towns and the annual subscription is very low. Moreover, some societies have special sections to encourage the beginner.

By becoming a member of a society you get far more than an introduction to a number of collectors. Among other things you can attend meetings at which many points connected with collecting are discussed, and at every meeting you will be able to exchange unwanted stamps with other collectors who may have just what you require. Most societies also hold occasional sales at which members can sell small lots which they do not need and can purchase other lots which they do need.

It is a good plan always to have with you a small selection of swaps in a special slip-in pocket-book. You never know when you are going to meet another interested collector, and it is surprising how often you will come across a chance of improving your collection in this way.

So much for the first two methods of acquiring stamps. The third, you will remember, is by purchasing. The limit of your

purchases will depend, of course, upon the cash you are able to spare, and I will briefly outline the three best ways in which this can be spent.

The first of these is through a Postal Exchange Club. If you obtain a copy of one of the leading stamp magazines—*Stamp Collecting*, *Philatelic Magazine* or *Stamp Lover*—you will find advertisements of several well-known clubs, and you can safely send for particulars of any of them. Some charge a small entrance fee—ranging from 1*s.* to 5*s.*—and others charge no fee at all.

The way in which a club works is as follows. At monthly intervals the secretary makes up a parcel of stamps consisting of anything up to 30 small books, and these are circulated to all members on a mailing list. If you are one of these members the parcel reaches you in due course, and you are at liberty to take out any stamps which interest you, at the prices marked, and when you have been right through the parcel you do it up again and send it on to the next person on the list. The money for the stamps taken you post direct to the secretary.

The books of stamps of which the parcel consists are mounted up and sent in by members. These are usually duplicates and unwanted stamps which a member wishes to sell. You, as a member, are at liberty to send in as many books as you like, and these are included in parcels and circulated. When a parcel has been right round and is returned to the secretary, he breaks it up and returns the books to the several members who have contributed them, together with the money for the stamps taken by other members. All that he deducts to cover his own expenses is 10 per cent or 12½ per cent of the total sales.

There is also a lot of fun to be had in going through club packets, and they afford an excellent way of getting rid of unwanted material.

The second way is to buy stamps from dealers. You will find the advertisements of several reliable firms in the magazines mentioned, as well as in papers like *Meccano Magazine* and *Boy's Own Paper*. Most dealers send out approval sheets of stamps, and you are allowed to have these at frequent intervals, take out what you want, and remit for the stamps taken. There are many dealers who cater for the beginner and who issue approvals at as little as ¼*d.* or ½*d.* per stamp. Some, too, specialize in low-priced sets and useful assorted packets.

The third way is to buy lots at auction sales. There are several

of these sales held in London, from September to July, and you will find these, too, advertised in the stamp magazines. Anyone can visit a sale and look through as many lots as he finds interesting. You can then bid for a lot at the sale or, if you cannot attend, you can tell the auctioneer how much you are prepared to pay for a particular lot, and he will endeavour to get it for you as reasonably as possible. Auctions are made up of all kinds of lots, and you can buy as cheap as 5*s*. or as dear as a thousand pounds. But whether you buy or not it is an interesting experience to visit a sale.

We have now considered carefully all the main points connected with collecting, and all that remains is to remind ourselves of the three golden rules. These are: to collect only perfect specimens, not to attempt to collect too widely, and, if you spend money, to buy as cheaply and as wisely as possible.

TABLE TENNIS

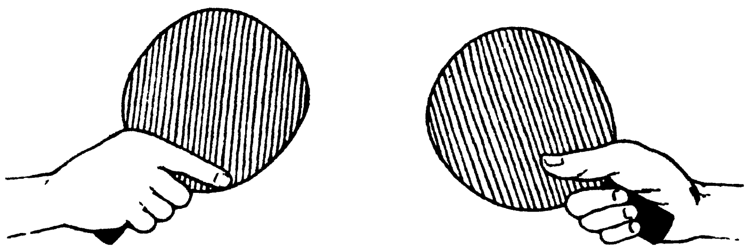
Without doubt table tennis has emerged from the old game of Ping-pong to become one of the fastest games in the world. In this article I will give the newcomer to the game some idea of the rules, should he or she become fortunate enough to possess a table tennis set, comprising net, net posts, rackets and ball. It is understood, of course, that should you not possess the regulation table 2′ 6″ high, 9′ long by 5′ wide, you would make use of whatever table in your house comes nearest to these measurements without its being too small. From my opening remarks you will gather that one would start off with a mild form of table tennis, practically Ping-pong, and, in time, depending on enthusiasm and liking for the game, would speed up to table tennis proper. Over a period it is amazing how much energy one can use and how fast speed develops. From a simple beginning at home you find yourself attached to a real sport, with your physique showing muscle, fitness, and a quick eye as the result.

Let us get on with the game. First of all, your net posts should be fixed at the centre of the table to carry your net across dead centre, stretched to a height of not more or less than 6″. Your table now being ready you ask yourself: What is the proper way to hold the racket? what is done to put the ball into play? and how is the score taken?

Holding the Racket.

The racket is held in the right hand as shown by the accompanying sketch. In the grip shown you have the one most universally used by the greatest exponents of table tennis, as it allows free motion, covering every stroke and aspect of the game from beginning to end. There are many other grips and styles used, but all to the ultimate detriment of the players who eventually take the game up really seriously. Some have found themselves fair exponents, although using unorthodox grips, but it should be made clear that when they have attempted to change in order to improve their play,

only a few have successfully done so. Left-handed players, of course, grip the racket in the same manner. I have made no attempt to show the wrong methods of holding the racket, as they are too



The grip

numerous. For beginners the one shown will carry you through every stage of your association with the game.

The Opening Service.

To set the game in motion the ball is held in the left hand, carried to within a few inches of the racket held in the right hand, then thrown swiftly towards the racket. Your right hand at this stage is moving to meet the ball. The ball so struck has to bounce first upon the server's own side of the table, proceed in flight over the net to bounce on the opposite side. Your opponent then strikes and sends the ball back over the net. From this stage onwards each opponent returns the ball after it strikes his own half of the table. The player who is unsuccessful in directing the ball on to his opponent's half of the table loses the point.

Scoring.

A game is usually made up of best of five, or best of three sets. A set is 21 points. The first player to reach 21 points is the winner of the set. This applies to scores from 21–0 or 21–love up to 21–19. Should both players, however, reach 20–20, or 20-all as it is termed, then one or the other must lead by two clear points to win. For instance, 21–20 does not win, it must be 22–20 or 23–21 or 24–22, and so on. Each player serves five times in turn, and when the scores are called after each point the server's total is mentioned first; for instance, I win the service either through tossing a coin or by

playing one point, and proceed to play. If I win first point the score is called "one love"; you win the next point, and the umpire calls "one all". Should I win the next three points the score would be 4–1. The umpire would now call "service change", and you (the loser) would now serve, the umpire referring to the score as "1–4". After each 5 points are played the score of the player beginning service is always mentioned first, whether he is winning or losing. In this way the spectators and players can follow the score, and know who is leading, whether it be the server or the one taking the service; for instance, 14–16 would mean that the server is losing and 15–10 that the server leads.

Strokes and Spin.

Just to strike the ball is not sufficient in itself to control the behaviour of the ball; your command of the game will only be proficient when you have mastered the different strokes in their relation to the reaction upon the ball. In all ball games such as table tennis or lawn tennis, particularly where the ball is struck by a racket, one will hear the terms "plain hit", "top-spin", "chop", "half-volley"; these are the simple terms and we will treat each separately.

Plain Hit.

This stroke is deliberate and straightforward and (depending on the effort imparted) could be classed the fastest in the game, principally because, nothing else being intended, the ball flies true and straight. The racket must strike the ball flat, face on, and advantage should be taken of this shot on all occasions when the ball returned to you is high, and sent over without chop or spin of any kind. From this stroke evolve all others, and it should be used as often as the opportunity presents itself.

Top-spin or Over-spin.

These are one and the same, raising the ball in a high curve and causing it to descend steeply. To do this properly the racket should make contact first with the under-part of the ball; carry the racket up and round the face of the ball, completing the stroke with the arm fully extended upwards, and your racket completing a semicircle to the top side of the ball. This causes the ball to spin back to your opponent, its revolution being in his direction. The achievement of

good results depends on how quickly you execute the movement; the faster your arm moves the more speedily the ball travels.

Chop.

The chop is undoubtedly a defensive stroke, and to play it correctly one should keep in mind that force is its least essential requirement, because of the delicacy of action required in its execution. Playing the shot is the reverse action to top-spin, and your racket should first make contact with the ball a little above centre, the arm descending to a low bent position nearly completing a semicircle to the bottom side of the ball, thus causing it to spin clockwise as against the anti-clockwise motion of top-spin.

Half-volley.

Whereas in the previous strokes described the player would have plenty of action in so far as his body movement is concerned, the half-volley body movement is negligible, if anything at all; mainly due to the characteristic " near to the table " stance, and the fact that the ball is struck and returned the moment it strikes your own half of the table. In effect, the ball is struck on the bounce, with the racket in position to anticipate the ball at whichever part of the table it is about to strike. It may be wrong to say that movement is negligible, because the top half of the body must always be alert if the playing arm is to move from the right side to the left with the speed necessary to anticipate the flight of the ball from a fast, hard-hitting opponent. In the main, the half-volley is defensive except where a fast back-hand flick is developed. A word on the flick might be opportune here. This is usually a surprise close-to-the-table shot. It is the only fast half-volley stroke, difficult to execute, but you can be assured of its being a winner if played with confidence and speed from the back hand.

Back-hand.

Quite naturally you will be asking yourself, " Where does the back-hand come in?" The explanation is simple; it is merely the playing of the plain hit, top-spin, chop, &c., but using the opposite side of the racket. To do this properly your racket-holding arm is brought right across to the left side of your body if you are right-handed, and to the right side if you are left-handed. The body is moved slightly to allow movement to be easy and graceful, both for

the execution of the fore-hand and the back-hand strokes. On all occasions try to avoid playing in a position where the racket strikes the ball in front of your body. This is proof that your positional play is bad; the correct position for striking is with the arm extended from the body for fore-hand, and at least a racket's length from the body for back-hand.

We will presume that you have given the game undivided attention for a month or two, and now find your appetite whetted for the features that go to make table tennis a real sport, particularly if you have reached the confident stage, and can return the ball to strike whichever part of the table you please. Now you are ready to pass on from the " beginner " stage to the development of your own particular style, whether it be that of a player who prefers the attack, or one who prefers defence, or again one who can do both with equal confidence.

Defence.

We will take defence first, it being assumed that as a beginner you will meet better players for a time, and consequently you will be on the defensive. You will remember in my description of the strokes, the qualification " used mainly for defence " when referring to the chop and half-volley. This is correct, and a choice of either would depend on the force of the attack. Obviously, if the ball is not being returned with force, you could stand near the table and catch the ball on the bounce for half-volley return. Through time and with practice you would return even a fairly fast ball with the half-volley. We now come to the chop returns. Before explaining the particular advantage of the chop return, however, I would digress a moment by drawing attention to the effect of distance on the speed of the ball. Immediately the ball arrives at your half of the table it strikes the wood; as it leaves it is travelling at its fastest and not until it starts its down-curve floorwards has the speed diminished to any marked degree. The distance from the table at this point might be anything from one to ten feet, depending on the force imparted. This explains why defensive players of quality are found at varying distances from the table using the chop defensive stroke, which comes into use against really hard hitting from a foot to any reasonable distance from the table. The action in the use of the chop is beautiful to watch if properly played. Speed, so necessary in getting from one point to another, demands quick thinking and

fast footwork, as on occasion the attacker will drop a shot just over the net. If this happens when you are some distance from the table you will have to cover ground at a tremendous rate, if you are going to reach the ball before it bounces for the second time on the table or reaches the floor. When you do arrive in time to strike the ball, this more often than not is the opportune moment to change from defence to attack.

Attack.

Attack refers principally to the player who becomes really aggressive, moving quickly, both with feet and arm, putting every ounce of effort into the stroke, and in order that the ball shall travel at its fastest, using the plain hit. Naturally, in an evenly contested game, these shots are returned with the chop, and if your opponent is expert enough the chop will be such that you will be unable to continue the attack by using only the plain hit. When this happens you must bring into play your top-spin action. In other words, your opponent is bringing his racket from top downwards in the chop stroke. The antidote is the opposite action; start under the ball and bring your racket upwards as explained in the top-spin stroke; the attack will not be so forceful now until the opportunity presents itself for another hard plain hit.

Before closing this brief outline of the main rules and principal strokes in this fascinating and thrilling game, I should just like to say that a moment will arrive in the early stages of your association with table tennis when you will really look forward to your practice with enthusiasm. It takes many beatings to become proficient and experienced. On paper, one can give only rudimentary guidance. To gain practical experience look for a player who can beat you. When you have mastered him, move on to the next grade, always upwards, until you reach and associate yourself with the best players in the game. One last word of advice: " Keep your eye on the ball."

HOME HANDICRAFTS

INTERIOR DECORATING

In approaching this subject, it is proposed to consider the decoration of an ordinary room stage by stage from preparation to completion. Simple interior decoration presents no problems which may not be solved by care and patience. It is important to bear in mind two points: (1) Upon the time taken on the preparation of the work will depend its final appearance and success; and leading from this, (2) that it is useless to attempt to beat the professional as far as speed is concerned.

Making the Room Ready.

It is very important to clear the room as completely as possible. Curtains must be taken down and carpets and rugs removed. Ornamental lamp shades should be taken away, and even the linoleum. If it is necessary to leave any large item of furniture, it should be placed in the centre of the room and covered completely with dust sheets, or failing these, with rugs laid face downwards.

Stripping the old Wallpaper.

Take a pail of warm water and either a distemper brush or a large pad of soft cloth. Start in one corner of the room and thoroughly wet the paper right round the room. When this is done, go back to the point at which you started, and the paper should be sufficiently loosened to come away from the wall easily. If not, continue with the soaking until it does.

Now you will need a knife with a thin flat blade such as the stripping knife. If you have not a stripping knife, you can use a three-cornered trowel. Strip the paper gently, being careful to avoid digging the corner of the knife or trowel into the plaster. If part of the paper is still fast to the wall, soak it again and return to it later.

Cleaning off the Ceiling.

It is best to clean off the ceiling and frieze completely, and this is the next stage in the work. The frieze is the part of the wall between the picture rail and the ceiling, which is usually distempered. You will need some sort of a scaffold to reach the ceiling comfortably. The best scaffold is two pairs of steps and a strong board to rest on them. Failing this, use a kitchen table. One pair of steps wastes time and effort, as you can only reach a very small part of the ceiling before having to move them.

Take a pail of warm water and an old distemper brush or wet cloth, and begin by washing off the distemper from a strip of the ceiling right across the room. Wear an overall or your oldest clothes, and a cap. Change the water in the pail frequently. When the ceiling is quite clear of distemper, wash off the frieze in the same way.

Repairing Cracks in Plaster of Walls and Ceiling.

This is a most important stage in the work, as any cracks left will show badly on the finished job, as well as forming possible harbourage for vermin. To begin with, you will need a hammer and a small steel chisel. With these, cut away all the loose crumbling plaster round the hole or crack. Cut it out so that the crack is larger on the inside than it is on the surface, so as to afford a grip or key to the new plaster. Do this to all the cracks and holes you can see in walls and ceiling.

Now you will need a trowel and some Keene's Cement. This is sold, usually in 7 lb. and 14 lb. packets, at the decorator's, and is quite cheap; it is a pinkish powder. To repair a crack, mix a little Keene's Cement with water to a smooth paste. Do not mix much at a time as it sets fairly quickly. Now thoroughly wet the crack, and with your trowel fill it up with the cement. Leave the surface of the cement a little above the surface of the wall or ceiling, as it will shrink a little as it sets. Now move on to the next repair, and so on right round the room. When they are all filled up, go back to the first one and slap a wet brush across it backwards and forwards until it is smooth and flat. Another method of finishing off is to wait until the cement is really hard and then rub it down with glass-paper.

Cleaning the Paintwork.

Whether the woodwork in the room is to be repainted or not, it will need cleaning. For this process you will need a packet of sugar soap. You can buy it at the local hardware stores or decorator's shop, and it should be mixed with water exactly as instructed on the packet. You will need two pails this time, one to hold the sugar-soap solution and one to hold clean water. You will need your distemper brush again or your rag, and also a clean rag or a chamois leather. The soap solution will remove the dirt from the paintwork as if by magic, and the work is then washed with the clean water and dried with the chamois leather. There is one point on which one must be very careful: when washing down a large surface such as a door, start washing at the bottom first, otherwise the soap solution will run down over the dry dirty surface and leave marks which are very difficult to remove.

Distempering the Ceiling.

There are various brands of washable and oil-bound distempers and water paints. Buy the best you can, and mix it up strictly according to the maker's directions. Avoid using it too thick or you will leave ugly brush marks. Keep a stick in the pail with the mixed distemper and stir it up frequently, as it tends to thicken at the bottom of the pail. Start at one end of the ceiling and distemper a strip about 12" to 18" wide. Move your scaffold and start another strip, and so on until the ceiling is covered. The object of distempering narrow strips is to continue with the next strip before the edge of the first is dry. If it is allowed to dry, a distinct mark will result.

The frieze should next be distempered down to the picture rail.

When the distempering is finished, go right round the room with a wet rag, wiping off the splashes before they have time to become hard.

Painting the Woodwork.

First rub down smooth all rough places or they will make blemishes on the finished surface. The best way to do this is to buy one or two sheets of waterproof glass-paper and use it wet;

or the local shop may have one of the abrasive blocks which are sold for this purpose. They are sold in smooth, medium, and coarse grades, and the medium type should be suitable. All holes and cracks in the wood must be carefully filled up with stopping. Use plastic wood for this, and press it firmly into the hole and smooth it off quite level.

If the finished colour of the paint is not greatly different from the existing paint, it is possible to complete the job in one coat, but an undercoat is usually necessary. Buy the best paint you can, and use with it the undercoat recommended by the makers. If the paint needs thinning before use, the local decorator will supply a suitable thinning liquid. Fig. 1 shows the correct order in which to paint a panel door.

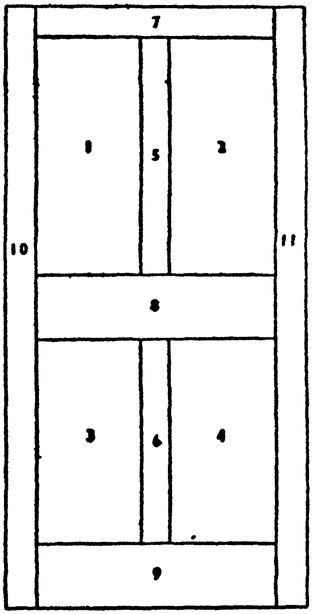


Fig. 1

Be scrupulously clean in your painting, and keep a damp rag handy to wipe off splashes. Elsewhere in this section you will find some hints on the care and cleaning of your brushes.

Hints on Hanging Wallpaper.

If this is a first attempt, do not choose a wallpaper with a definite pattern which needs careful matching. There are many attractive mottled designs which escape this complication.

When measuring the room for the wallpaper, remember that the paper is sold in " pieces ", each 21" wide and 12 yards long. In addition to the 21" of actual pattern, the paper has a selvedge or strip of waste paper on each side. This is usually about ½" to ¾" in width and must be trimmed off. The joints in the wallpaper may be either " butted " or " lapped ". In the first case, both edges of the paper are trimmed, and when hanging, the strips of paper are placed edge to edge. In the case of the " lapped " joint, however, only one edge is trimmed and the lengths of wallpaper overlap

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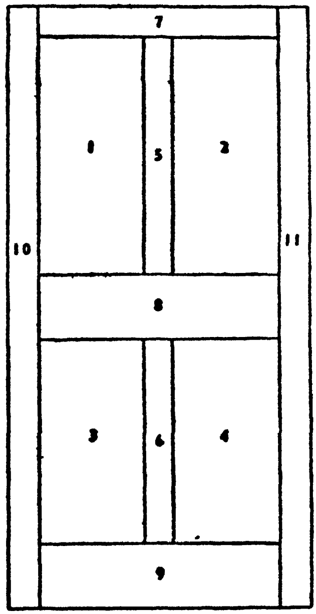


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each other. Fig. 2 makes this clear, and for your early attempts it is advisable to use the lapped joint and to have the paper trimmed at the shop. Most decorators' stores have a machine for this purpose, and the method is both speedy and accurate.

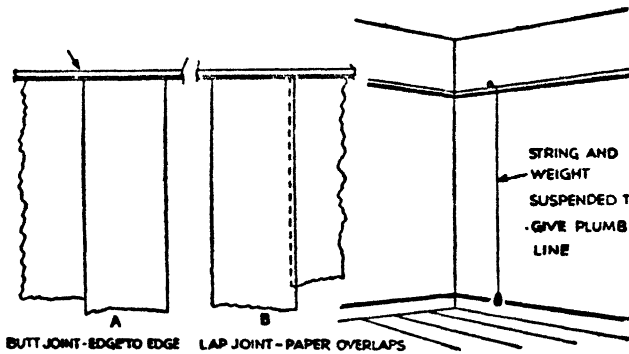


Fig. 2

Cut off your first length of paper and allow it to be 6" longer than the total distance between the top of the skirting and the bottom of the picture rail. Lay it face downwards on a flat table covered with sheets of newspaper. Paste for wallpaper may be made up at home, but it is more convenient to buy a packet of decorators' paste in powder form and make it up according to the directions.

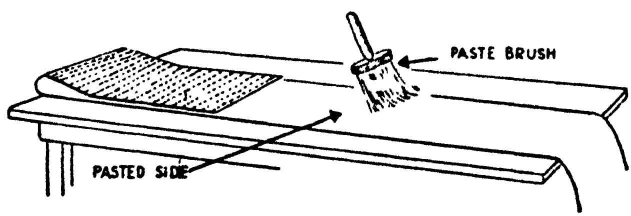


Fig. 3

Having pasted the portion of the paper which lies on the table, fold the pasted surface in half and draw the remainder of the paper on to the table. (See fig. 3.)

Before applying the first length of paper to the wall, suspend from the picture rail a length of string with a weight on the end at about 2 feet from the corner of the wall. When steady, the string

will be perfectly plumb and will give you a guide for your first strip of paper (fig. 3). Now take your folded paper and hold it to the wall, allowing it to extend about 3" above the bottom of the picture rail. The weight of the paper will cause it to unfold and hang down, and it may be pressed back to the wall surface and smoothed with a pad of soft cloth or a clean clothes brush. If it is not exactly parallel to the plumb-line, you should pull it from the wall and adjust it.

Start at the corner of the wall farthest from the window, so that you may make your initial efforts in the least conspicuous place.

To trim the paper neatly to the skirting and picture rail, first brush it hard into the angle formed by the wall and the wood, and then draw the closed point of your scissors along the crease. Now gently draw the paper from the wall and you will see a clearly defined mark left by the scissors as a guide for cutting (fig. 3). Use this method at all obstructions, such as the fireplace, window frames, &c.

After you have hung the first two or three pieces of paper, you will begin to get the knack of it, and patience and perseverance will help you to make a creditable job.

STAINING AND POLISHING A FLOOR

Stain applied to a floor after careful preparation, and then wax-polished or varnished, forms an attractive and inexpensive finish. The first stage of the work consists of thoroughly cleaning the floor. The application of water will result in some roughening of the surface owing to the lifting of the grain; smooth down all such rough places by vigorous rubbing with " middle two " glass-paper wrapped round a block of cork or wood. Rub only with the grain of the wood, that is, the long way of the boards. All loose or lifted boards must be nailed down securely, and all curled or protruding edges flushed down with plane and chisel. Next take a nail punch and drive the heads of all the floor nails slightly below the surface. At the same time keep a careful watch for all old lino tacks, etc., and remove them.

All nail holes and cracks in the boards must now be carefully filled up. For this purpose, plastic wood and a stopping knife should be used. For large gaps between the boards and under

the skirtings of the room, plastic wood may be a little expensive to use in quantities, and you can make up your own filling material in this way. Tear up small pieces of newspaper and stir them into a pail of hot water. You will need a good deal of paper, and it will need stirring thoroughly. Leave it to soak for a few hours, and then pour off the superfluous water. Mash up the saturated paper into pulp and add a small basinful of paperhanger's paste, and mix thoroughly until you have a sort of stiff putty. Fill up the gaps and cracks with this and let it dry. Rub it down smooth with glass-paper, and it will take the stain just like wood.

Staining the Floor.

You may use oil, water, or spirit stain. Spirit stain, however, must be applied very quickly, and is really unsuitable for a large area such as a floor. Water stain can be made up easily by adding permanganate of potash crystals to water until you have the shade required. Make sure the crystals are really dissolved, and try the stain on a spare piece of wood. The disadvantage of water stains is that they tend to roughen the surface by lifting the grain, as did the water when you washed the floor.

Oil stains bought ready made at the decorator's shop are made in various colours and are easy to apply. Use a big brush and work fairly quickly, and then allow to dry thoroughly.

Floor varnishes are sold specially prepared for this work, but many people prefer to use an ordinary wax floor polish. If this is well rubbed in until all trace of stickiness disappears, it gives a pleasant dull finish which will improve at every subsequent application.

REPLACING A FUSE

The renewing of a burnt-out fuse is a very simple job, but because it usually has to be done in a hurry, it often causes considerable confusion.

Everyone in the household should know where the fuse-box is, how to tell which fuse has burnt out, and where the necessary equipment is to repair it. In most modern houses the fuse-box is situated near the meter, often in the cupboard under the stairs. Here you will find the end of the thick cable which brings the electricity supply to the house. It ends in a sealed box which contains the company's fuses, and usually the main switch is here. *This*

switch MUST *be turned to the " off " position before any work on the installation is attempted.* From this point two wires lead to the consumer's fuses. These may be in a wooden box with a glass door, or in one or two iron boxes containing fuses for lighting and power circuits. These iron boxes are often fitted with a switch which has to be turned off before the box can be opened and access to the fuses obtained.

The fuse-holder is simple: a porcelain handle which engages into clips. The fuse-wire is fixed to two terminal studs, each fitted with a washer. Each circuit in the installation is fitted with a fuse, which acts as a safety valve. If for any reason the current rises above the safety point, the fuse-wire melts and breaks the circuit and thus prevents fire or other serious damage. It follows that it is of the utmost importance to fit only the correct type of fuse-wire. Fuse-wire is graded in sizes, reckoned in amps. Usually lighting circuits require 5 amps, and those with heavier loads for heating and cooking appliances need 10 or 15 amps. In most cases the correct size for any particular fuse is found moulded in the porcelain of the fuse-holder, or stamped or labelled on the box.

Having located the box, pull out each of the fuses in turn and make a note which lights or equipment it controls. Then you will be able to go straight to the right fuse in case of a burn-out. This finding of the right fuse is made simpler by the fact that a holder, the fuse-wire of which has melted, will often be warm to the touch for quite a while afterwards.

The actual replacement is very simple. Slacken the screws at the terminal and remove the remains of the old wire. Thread your new wire into place and tighten the screws. Do not over-tighten the screws, or you may cut or damage the soft wire, and do not stretch the wire tightly between the terminals. A certain amount of expansion and contraction takes places as the current is switched on and off, and this will cause the wire to break if stretched tightly.

It is a good plan to institute a " first-aid " box for the fuses. An old cigarette tin will do. Put in a supply of wire of the correct thicknesses, a piece of candle, and a box of matches; also a small screwdriver. Mark the box plainly, and make sure that everyone in the household knows where it is and what it is for. If possible, buy a spare fuse-holder of the pattern in your fuse-box and keep it ready wired. Then if a fuse " goes " you may change the holders and rewire the burnt-out one at your leisure.

A fuse that burns out frequently is not only a safety valve, but a warning that something is wrong in that particular circuit.

If all the lights and appliances cease to function at the same time, but the other houses in the street are receiving current, then the company's fuses in the sealed box may have burnt out. These may only be attended to by an official of the company, and you will have to telephone them. Find the number *now*, write it on a piece of paper, and put it in the fuse first-aid box.

REPAIRING A LEAKY TAP

Before attempting any repair or adjustment to any part of the water service, it is almost always necessary to turn off the water supply at a stop-cock. Moreover, since a leak or burst pipe may occur when you are alone in the house, you should know how to turn off the water quickly. The main stop-cock to the premises is usually situated inside an iron cover plate on the pavement or forecourt outside the house. On lifting up the plate, you will see it at the bottom of a sort of miniature well about 2′ 6″ deep. The object of so burying the stop-cock is to lessen the risk of frost damage. The turning device is usually in the form of a square nut, on to which fits a socket shaped on the end of a water key (fig. 4). Always keep the cover plate free of dirt and mud, and the hinge greased, and the well itself clear of dirt and stones.

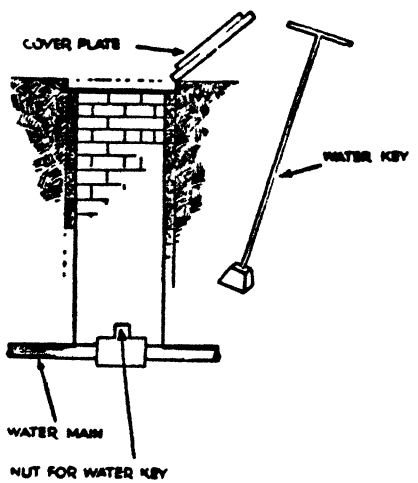


Fig. 4

In most districts the right to turn off the water at the main stop-cock is reserved by the water company, and in case of trouble a turnkey should be notified. It is wise to seek out his telephone number and make a note of it

There is often another stop-cock inside the house, sometimes

under a trap-door just inside the premises, sometimes near the kitchen sink. Search for this and make sure it is readily accessible. In many houses, too, there is a water storage tank in the roof holding 40 or 60 gallons of water. This will supply the taps in the bathroom and perhaps others, and it will be necessary to stop the flow of water from this tank in case of a burst pipe in the system, or to avoid wasting all this water if you wish to replace a washer on one of these taps. The outlet pipe from the tank may be fitted with a stop-cock

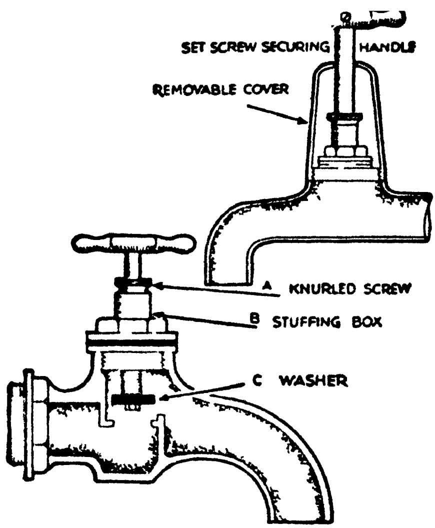


Fig 5

of its own, but if not, the flow may be stopped by plugging the pipe inside the tank. A plug shaped from a large cork or from a piece of wood, wrapped with rag, should be prepared and kept near the tank ready for use.

It must be understood that no repairs to any part of the hot-water system must be attempted while the fire which heats the water is alight.

To come now to the perennial nuisance, the dripping tap. The leak will usually come from one of two places: from the spout or nozzle of the tap, or else from up near the handle. In the first case a new washer is required. Look at fig. 5. Just below the stuffing-box you will see a large hexagonal nut. This must be unscrewed,

using an adjustable spanner or a pair of adjustable pipe grips. The pipe grips are of the pattern known as " Foot-prints " and will grip a pipe or any size of nut. The nut, however, must be protected from the teeth of the Foot-prints by a thickness of rag. The nut may unscrew in a clockwise or anti-clockwise direction. Slacken it right off and lift the whole thing out of the body of the tap. There, on the lower end, you will find the washer attached to a loose fitting called a " jumper ". The washer will be secured by a small nut, which must be unscrewed. The old washer is taken off and a new one substituted. There are different sizes of washers for bath taps and smaller taps, and different types for hot or cold water. The local hardware merchant will advise you of the size and type needed.

Now for the leak which appears at the stuffing-box. This is caused by faulty or worn-out packing within the box itself. This packing consists generally of well-greased string, and access to it is obtained by unscrewing the knurled cap shown at A in fig. 5. Remove the old packing by poking it out with a bradawl or an old knitting needle, and almost fill the space with freshly-greased string wound round the spindle and pushed down with a piece of wood. When the space is almost full, screw on the cap and turn on the tap once or twice to settle the packing. This is one of the jobs for which it is unnecessary to turn off the water at the stop-cock.

Lastly, the modern tap with the chromium cover works exactly the same as the old-fashioned kind. The set-screw in the handle is released, the handle taken off, and the cover then unscrewed to reveal the fixing nut and stuffing-box.

FIXING SCREWS TO BRICK, TILES AND PLASTER

Where a fixing has to be found in a bare brick wall (that is, when the joints between the brickwork are fully exposed), the wood plug method is still widely used and is reasonably efficient if done properly. Using a plugging chisel (fig. 6) and a heavy hammer, a portion of the jointing between two bricks is cut away to a depth of about 2½". A plug such as that shown in fig. 6 is then prepared. It must be cut from a straight-grained piece of timber and must be well seasoned, otherwise it will shrink and become loose and useless.

You will notice that owing to its shape the tapered part of the plug turns slightly as it is driven in the hole and thus gives a better grip. The taper on the plug must be very slight or it will grip only at the outside of the hole. After being firmly driven home, the protruding part of the plug is cut off flush to the brickwork.

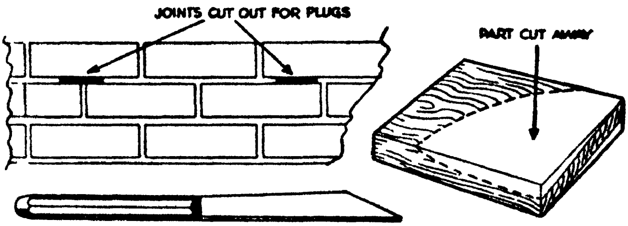


Fig. 6

When fixing to a wall which has been plastered, and the joints between the bricks are invisible, or in the case of stone or tiled walls, the Rawlplug method is the one to use—in fact, it is simpler, neater, and more efficient in all cases. A hole is drilled into the wall, using a hammer and the Rawlplug tool shown in fig. 7. A fibre plug of the correct size is then inserted and is ready for the screw.

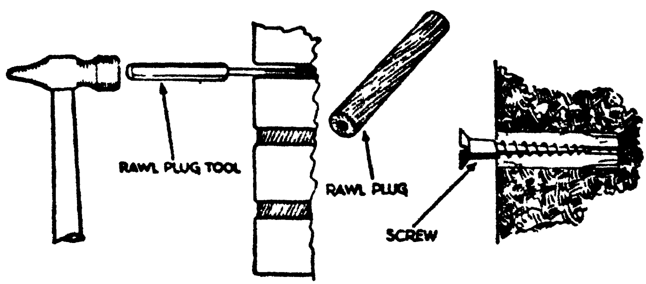


Fig. 7

Driving the screw has a twofold effect; it cuts a thread in the walls of the fibre plug, and it also expands the diameter of the plug, which then obtains a perfect grip. Fig. 7 makes this quite clear. A medium-sized Rawlplug in a brick wall will hold half a ton. When commencing to drill a hole for a Rawlplug in a glazed tile, a series of very light taps should be given, at the same time rotating the tool so that the glazed surface is removed.

REPLACING A BROKEN WINDOW

First remove the remains of the broken glass. The quickest and safest way to do this is to push out the fragments from the inside, protecting the hands with a pad of rag. Most of the old putty will have been removed with the old glass, but the remainder must now be cleared. The professional uses a " hacking knife " and hammer for this job, but a stiff shoemaker's knife or an old table knife will serve the purpose. If the putty is very old and has set rock-hard, pass a hot poker over it once or twice, and that will soften it a little. When the rebate (or groove in which the glass rests) is quite clear of putty, it is a good plan to give it a coat of paint right away. It will preserve the wood and will prevent the oil in the new putty soaking away.

Now measure for the new glass, and remember that the new square must be $\frac{1}{8}''$ less in length and breadth than the space it is to occupy; so for a space of $24'' \times 24''$ we shall need a piece of glass $23\frac{7}{8}'' \times 23\frac{7}{8}''$. The reasons for this $\frac{1}{8}''$ of clearance are (1) that the new glass may fit quite easily, and (2) so that the bedding putty will squeeze all round the edge of the glass and give a cushioned effect against vibration. The sections through a glazed sash rail make this quite clear. To avoid mistakes, always measure the size twice. In old windows there is sometimes a good deal of distortion, so that it is prudent to measure all four sides.

Buy sufficient putty to do the job, at the shop when you buy the glass. Good linseed-oil putty should be soft enough to work easily between the fingers, but not so soft as to be sticky. Over-soft putty can be stiffened by kneading a little whiting or plaster into it. Hard putty may be softened by warming at the fire and kneading in the fingers.

The next stage consists of pressing into place the bedding putty. This should almost fill the rebate, and then the glass should be pressed gently into place. This will squeeze the putty out all round the glass (fig. 8). Now a glazing sprig should be driven in, in the centre of each side of the glass. Glazing sprigs are small nails specially made for this purpose, and you should try to get a half-dozen when you buy the glass and putty. Ordinary gramophone needles will, however, serve the purpose quite well.

The exposed part of the rebate must now be quite filled up with

putty and smoothed down neatly with the putty knife. This requires a considerable knack, and you will glaze a good many panes before you can imitate the professional. A damp rag prevents the putty from sticking to the hands. Any irregularities may be smoothed

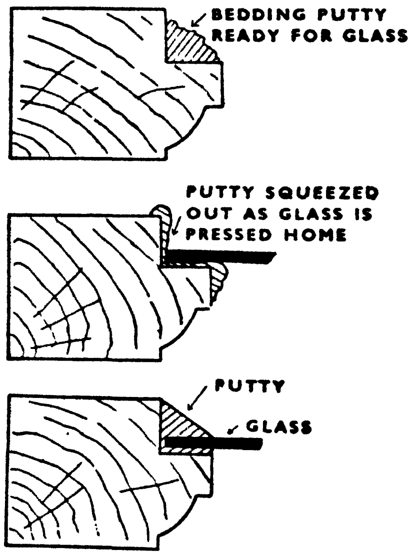


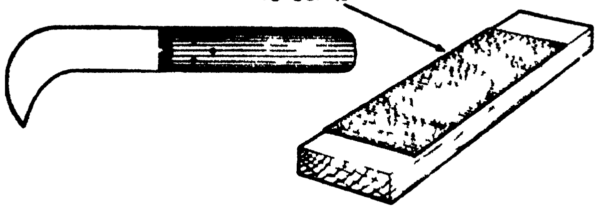
Fig. 8

down by brushing the putty with a soft brush, such as a household hand broom, or a "jamb duster". Neatly trim away the putty which has squeezed out inside the window and then give the new putty a coat of paint. Do not clean the window for a few days, but a light rubbing with a duster may be given to remove most of the finger-marks.

PATCHING LINOLEUM

It sometimes happens that, while the linoleum in a room is still quite serviceable as a whole, there are one or two places where a patch is required. Such a badly worn place often appears just inside the door, or, maybe, where a chair castor has worn a hole.

Material for such a small patch may perhaps be taken from under some large, permanently situated piece of furniture—a piano, a sideboard, or a bed—but it is wiser to order a little extra when the linoleum is first laid, so that a little can be kept in stock.



Linoleum knife Simple knife sharpening board

Fig. 9

You will need for this job, first, a sharp knife. A proper linoleum cutting knife is shown in fig. 9, but almost any kind of knife will do so long as it has a keen edge. If you have no oilstone on which to sharpen a knife, a gadget such as that shown in fig. 9 is easily made and is most useful. It consists merely of a 3" strip of fine emery cloth glued to a strip of wood of similar width about ½" thick and

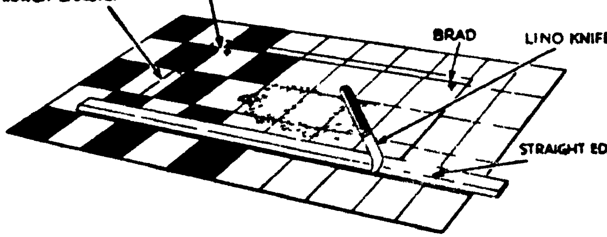


Fig. 10.—New patch laid over worn place, ready for cutting

two or three inches longer than the emery cloth. A few strokes on this " knife board " will produce a good cutting edge, and the emery cloth may be renewed as it wears out.

In addition to the knife, you will need a piece of wood about 3 feet long to use as a straight-edge to guide the knife, and an ounce or two of linoleum brads. In default of the proper linoleum brads, use headless boot brads, which can be bought at any shoe repairer's.

First cut your new patch from one of the places mentioned. It should be large enough to cover the worn place and extend beyond it to good sound linoleum. Lay it down over the place so that it exactly matches the pattern, and secure it by driving one brad in each corner. Now cut all round the edge of the patch, so that your knife penetrates right through the old linoleum to the floorboards (fig. 10). The old and new pieces may then be lifted out still fixed together by the brads. Separate them, and you will find that the new piece will fit exactly into the place of the old. Nail it down, using one brad every 3" all round.

For very small patches, such as those left by the pressure of a chair castor, an irregular-shaped patch will be less conspicuous than a square or rectangular one.

CARE OF BRUSHES

It is true to say that, for every paint or distemper brush worn out by honest use, ten are made useless by mishandling and neglect. A good brush is an expensive item, and it is well worth while spending a little time and trouble in looking after it.

The most useful kind of paint brush for the amateur is the flat rubber-set brush. It is graded in sizes by width from ⅜" to 4". Distemper brushes are graded in weights, usually from 8 to 12 oz., and also by the number of " knots " they consist of. For the young reader of this book a 4" flat brush is to be preferred.

Another useful brush is known technically as a " jamb duster ", and, as its name implies, it is used for removing dust, especially from awkward corners, during painting. Other brushes known as " liners " and " fitches " are sold in various sizes, and are used for making lines in paint and for fine decoration generally.

Before use, a new brush should be well shaken to remove loose hairs, dust, &c., and then soaked in clean water. This swells up the bristles and handle. It should be shaken clear of water before being dipped in the paint. The exception to this rule is in the case of varnish and enamel; brushes used in these materials should be kept perfectly dry. When stopping work for the day, a brush which has to be used again the next morning should be suspended in water. A small hole is drilled through the handle and a length of stiff wire is pushed through. The wire should be long enough to bridge the

mouth of a can or jar, in which the brush is suspended so that the bristles are quite clear of the bottom. Brushes which are to be out of use for some time may be kept in perfect condition if suspended in the same fashion but in raw linseed oil.

To clean a paint brush, first remove the bulk of the paint by washing in paraffin. Then wash completely clear of paint in turpentine or turpentine substitute. Finally, wash in warm water and yellow soap, wrap the bristles in greaseproof paper, and store flat, preferably in a warm place. Distemper brushes should be washed out with warm water and rinsed out with cold at the end of each day's work. They should be stored flat, so that any distortion or crippling of the brushes is avoided. As with the paint brushes, they should be well soaked in water before use when new, or after having been laid by for some time.

SIMPLE METAL-WORK

Although the manufacture of useful or ornamental articles in sheet metal calls for a considerable amount of manipulative skill, which is to be acquired only by practice, all the operations described in these notes can be carried out by any painstaking and intelligent boy who is keen to earn the honoured title of " craftsman ".

MATERIALS

Tinplate.—This word is a misnomer, the sheet being in fact rolled mild steel with a thin coating of tin. It is an ideal medium for making working models and articles of utility, being easily cut and bent. The only satisfactory method of joining it is by soft soldering (see p. 555), as other methods will buckle the sheet and burn off the tin. Soft-soldered joints are easy to make.

Aluminium.—This is very ductile, but does not lend itself so readily as tinplate to construction. It is somewhat more costly and is liable to bruising under the blows of forming and hammering. It requires special treatment for soldering. On the other hand, aluminium is universally employed for the fabrication of radio receiver chassis and screens; and it also has considerable possibilities for ornamental articles, particularly pierced metal-work. It possesses a lustre which does not tarnish easily.

Copper.—This is the ideal metal for ornamental and decorative work. It is comparatively cheap, extremely ductile and malleable, and can be hammered or formed into many complex shapes without cracking or thinning; its rich red tone greatly enhances the appearance of the finished article. Copper-work hardens; repeated hammering or bending hardens it, but the original properties may be restored by heating the part to a dull red and allowing it to cool. Cold-rolled soft copper should be obtained.

Brass.—This is an alloy of copper and zinc in widely varying proportions according to the class of work it has to do. The most ductile brass contains 70 per cent copper, 30 per cent zinc, and is

called " cartridge brass ". It is almost as malleable as copper and is more easily sawn, filed or drilled, as it has not the tendency which copper possesses to clog the tools. Brass-work hardens to a greater degree than copper, and requires annealing (see below) between successive operations, otherwise surface cracks may develop. You should ask for " quarter-hard " brass; if you can only get " half-hard " temper, as often happens, the sheet should be annealed before starting work on it; hard brass has a tendency to split on sharp bends, especially if the set is " along the grain ".

Zinc.—This metal finds little use in the articles mentioned herein, but is quite useful, having considerable resistance to corrosion. Being comparatively soft, zinc can be cut with a pointed knife if fairly thin; and you can make a wide variety of templates, stencils, or similar patterns out of it.

Measuring the Material.—Sheets are usually measured by gauge. The following British Standard Wire Gauges are those most useful for our present purpose:

S.W.G.	10	12	16	18	20	21	22
Inches	·128	·104	·064	·048	·036	·032	·028

For determining the gauge of your material, a wire gauge, though rather costly, will be found invaluable.

TOOLS AND EQUIPMENT

Much can be done with the modest range of tools mentioned below. Other tools can be improvised as you gain experience. Of course, good work can only be done with good tools, so that it pays in the long run to buy only the best. Similarly, take care of your tools, if you want them to perform accurate work for you.

The Bench.—The two main essentials for a work-bench are convenient working height combined with rigidity. Although any substantial, well-made table can be improvised, a proper work-bench is desirable; its top should be sufficiently thick for clamping on a parallel-pattern engineer's vice with 3-in. minimum jaws.

Vice.—A parallel vice is invaluable for holding thin sheets whilst bending, cutting or marking out, also to grip hardwood blocks when you are forming or doing a hundred manipulative jobs. Without a vice you cannot have the free use of both hands. The majority of engineer's vices have hardened jaws secured by countersunk

screws, the working face generally being serrated. For the class of work contemplated in these notes, the serrations would inevitably mark the work, particularly in the softer metals; and it is advisable to have the serrations ground out so as to leave a plain face. This facing should be accurately done on a machine tool, but any local engineering firm will probably undertake it for you, at the cost of a few shillings. A common device is to fit temporary ("fake") jaws, made of sheet brass, over the jaws of the vice, but we do not recommend you to try this.

Never use the flat surface of the moving section as an anvil; if you do, you may eventually fracture the vice across the neck.

Endeavour to fix the vice at a natural working height. A bad position is a prolific cause of bad work, besides making one's back ache. The ideal position is to have the top of the vice level with the elbow when the arm is bent and one is standing before the bench.

Shears.—Invest in a good-sized pair of hand shears (fig. 1), say 10 in. These will tackle anything up to 16 S.W.G. ($\frac{1}{16}$ in.). When using, one hand guides the work while the other applies pressure by gripping near the end of the handle, with the first finger between; after a little practice a scribed line can be followed with ease. Do not attempt to cut beyond the capacity of the tool or you will blunt its edges. If the palm of the hand is held too close to the curved ends, when the handle closes a painful blood blister may result.

Hacksaw.—Fig. 1 shows the most handy pattern. This hacksaw will accommodate any length of blade, besides permitting clamping on four levels. The usual pitch of a medium hacksaw blade is about 12 teeth per inch, but for sheet-metal work you need something much finer, say 20 per inch.

In sawing, apply a steady pressure on the cutting (forward) stroke only, and do not twist the frame or you will almost certainly snap the blade. Do not confine the cutting to the centre of the blade, but use the full length of the saw; practice is the only sure guide to the amount of pressure and speed of cutting that you can employ. Keep both pressure and speed down at the start. Before tightening the blade check the cutting direction; the cutting edges of the teeth must point forward, otherwise a few strokes will ruin the saw.

Metal-piercing Saws.—One of these will be needed for any piercing of metals (fig. 1). It is a somewhat specialized branch of

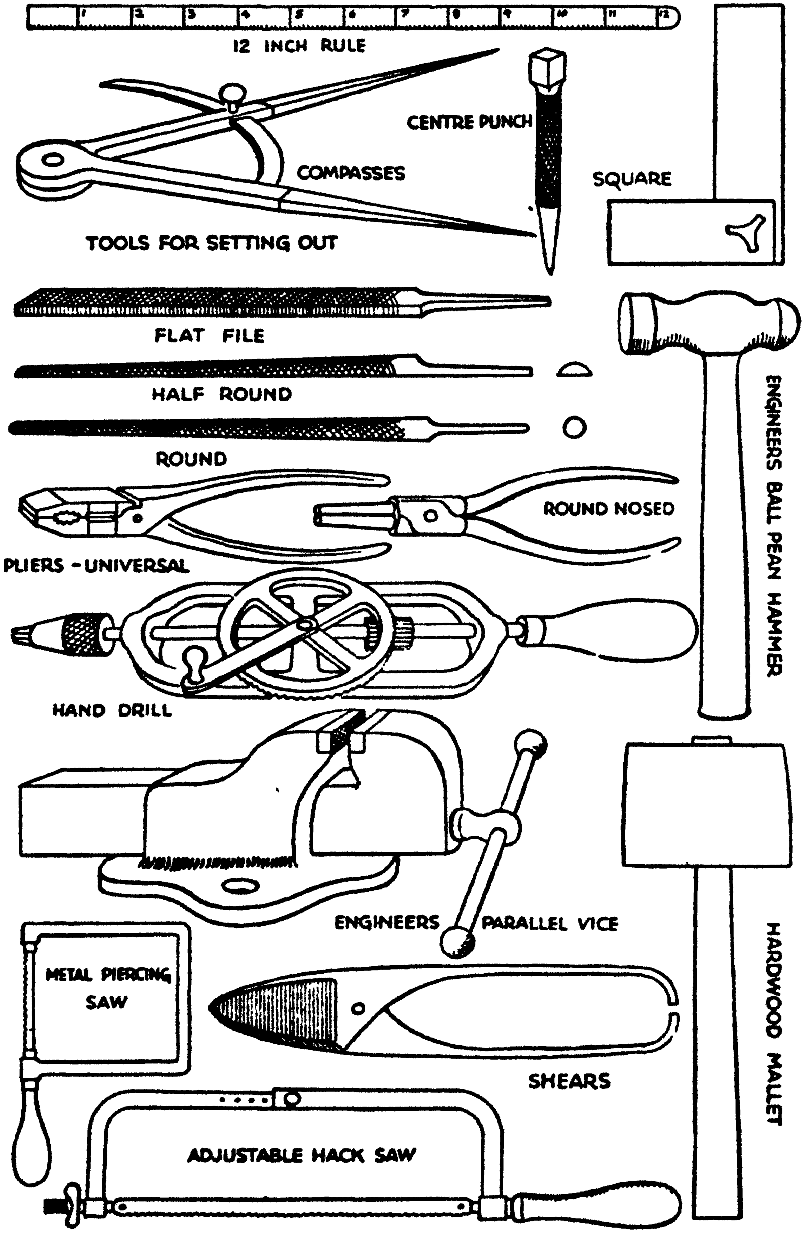


Fig. 1.—Tools and equipment

sheet-metal work, demanding considerable patience; but it offers great possibilities in ornamental articles, as we may see from the pierced silverware of our own craftsmen, and the cheaper pierced brassware of the East.

The saw frame resembles that used for fretwork, but is somewhat stiffer. The normal woodworker's fretsaw blade is useless. The tooth pitch is too coarse, and the teeth will be quickly stripped. Jeweller's metal-piercing saws are necessary; they are sold in packets like fretsaws and are graded according to the pitch of the teeth. No. 0 will cut copper and silver-base metals of thin gauges effectively.

For extremely small work a somewhat different pattern of jeweller's saw is used. Here the chief advantage is the movable section which will accommodate short lengths of broken saw. When using these saws a fairly high speed is desirable, the forward pressure must be imperceptible, and the frame must not wobble, otherwise the blade will kink and probably snap.

Pliers.—You will require a pair of universal pliers (fig. 1), also a small pair of round-nosed pliers for forming loops and corners in wire, among other things.

Hammers.—For general work you should have two ball-pean engineer's hammers (fig. 1). The ball is adapted to a wide variety of operations, riveting, internal planishing, shaping ornamental work, and so on.

A hardwood mallet is also required for planishing and flattening sheet metal (fig. 1). This tool is also useful in initial bending operations in soft metals, since it obviates the risk of marking the surface with the hammer. A beech or boxwood joiner's mallet is quite effective; a hide-faced tool is the ideal, but its cost is considerably greater.

Hold the handle of the hammer at the end when striking. It is impossible to take advantage of the balance of this tool, or to be reasonably certain of hitting any particular place, if the handle is held short in the hand and the hammer grasped under the head. Do not mark the faces of hammers by striking the hardened ends of tools such as files, tongs and punches, because the marks and burrs thus formed will be reproduced when bending and flattening the metal sheet.

Hand Drill.—A small hand drill, maximum chuck capacity of $\frac{1}{4}$ in., with about eight selected drills from $\frac{1}{16}$ in. to $\frac{1}{4}$ in., will suffice

for the sizes likely to be encountered in your early work (fig. 1). A slightly larger hole can be opened out with a round file. Carbon steel drills will easily tackle the thin sheets; high-speed drills are much dearer and for beginners unnecessary. When using the drill, endeavour to keep it perpendicular. Support the work on a piece of wood, and use only light pressure when you feel that the drill is breaking through, as twist drills are inclined to dig into the work and snap when completing holes, especially in brass and copper. A light pressure and as high a speed as the gearing permits are essential when using the smaller drills.

Files.—You will require three or four 8-in. smooth and second-cut files for removing sharp edges, finishing external soldered parts, and final shaping of complex pieces. We recommend an 8-in. second-cut, an 8-in. smooth flat file, an 8-in. half-round smooth file, and a 6-in. round smooth file; the two latter are for making holes true, finishing concave sweeps, and finally sizing curved surfaces (fig. 1).

A high degree of skill, to be acquired only after long practice, is the secret of correctly using a file.

Choose a file handle that is large enough to ensure a good grip with the thumb extended along the handle. Only in light work is a thumb-and-finger grip on the end of the file required for guidance. Normally you should let the ball of the hand rest comfortably on the position, and keep the blade of the file as nearly as possible on a horizontal plane; pressure should be applied on the forward stroke only. Do not lay files on top of each other, a practice very detrimental to their cutting properties. Another thing which shortens the life of files is oil and grease. Keep your new files for copper and brass; when slightly worn they can still be used for general work in all metals.

Tools for Setting out the Work (fig. 1).—The really essential tools comprise:

One 12-in. steel rule, preferably graduated in 16ths of an inch.

One steel scriber. This can be readily made from a length of ⅛-in. silver steel rod by filing one end to a sharp point, heating to dull red, and quenching in water. The point will now be too hard. It should be tempered by removing the scale with emery cloth until it is bright, then heat at about 2 in. from the point in a small gas flame, keeping the scriber turning; oxidizing colours will be observed to move towards the point. When a medium straw colour has done

this, quench the rod in water. The tool will now stand sufficient pressure to mark a line without the point snapping.

A pair of 8-in. wing compasses or dividers, for marking out circles and arcs.

An 8-in. try-square. The joiner's tool will be sufficiently accurate for sheet-metal work.

A steel centre punch for marking the centres of holes.

SOLDERING

Most of the joining described herein is by soldering. There are two kinds, soft soldering and hard. By the former, metal surfaces are made to adhere to each other with the aid of a low melting-point tin alloy. Although giving a strong joint for the class of work to which it is adapted, the solder does not amalgamate with the metal as does that used in the hard-soldering process; the latter requires more preparation and considerable heat to ensure success.

Amateurs frequently fail in soldering, generally through lack of a few simple precautions. The most important of these are:

(i) Correct condition and heat of soldering bit.
(ii) Flux suitable for nature of work.
(iii) Work must be thoroughly cleaned.

The ordinary soldering bit for general work weighs 1½ lb. Small bits rapidly lose their heat, although for delicate work and awkward corners a small size—say ½ lb.—is necessary.

Solders.—Numerous special solders are available for particular jobs. The ordinary tinman's solder (65 parts tin, 35 parts lead) is a good general alloy for tinplate and copperwork, and is available at most hardware stores. Buy the thinner shapes if a small bit is to be used, or you will waste a lot of heat and time in the preliminary tinning of your bit.

Flux.—An extremely good flux for general use is zinc chloride. To prepare this, obtain a bottle of spirit of salts and pour into an earthenware or china vessel; then add small pieces of zinc until the effervescence stops. Do not under any circumstances use this flux on electrical or instrument work, because it has slightly corrosive properties. In larger work you can wipe the finished joint clean with a piece of cloth. It should not be used either for pewter or tin. There are numerous proprietary brands of flux on the market,

generally resin-base, for use with copper, brass and sheet tin. " Fluxite " is a serviceable brand.

Tinning the Bit.—This essential preliminary is best done with the aid of zinc-chloride flux. Heat the bit and test its temperature by immersing the tip in the flux; if a sharp " plop " follows it is correct. Should the copper be damp it is not hot enough; on the other hand, if the flux spurts and there is excess of steam, it is too hot. Touch the solder with the bit, which will immediately amalgamate with it; a quick wipe with a cloth will distribute a film of solder over the cleaned area. Do not allow the bit to approach red heat during subsequent use, or the tinning will be burnt off; but if this does happen, allow to cool to the correct temperature, then give

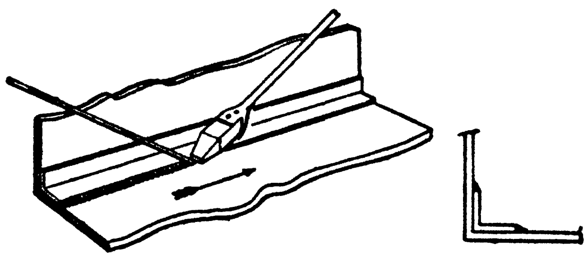


Fig. 2.—Soldering an angle joint

the tip a few vigorous strokes with a rough file to clean off scale, and retin it. The ideal heating medium is a gas flame, but an open fire is quite effective, provided that the iron is thrust well into it.

Soldering.—The work to be soldered *must* be quite clean. A light final rub with emery cloth will remove all traces of grease, but do not handle the area to be soldered, or your fingers will redeposit grease upon it. Apply the flux with a small brush. After heating the bit, dip it into spirit to clean it and touch it with solder in order to " charge " it; you will notice that the tinned bit has a high affinity for the solder. If the bit is at the correct temperature a film of solder will readily flow over the fluxed area of the work, the amount depending of course on the quantity fed from the solder stick. Many beginners use an insufficiently heated bit, the result being lack of amalgamation and excess of solder, which forms lumps instead of preserving an even flow.

The sketches show the usual types of joint that you will encounter. For the angle joint (fig. 2), after cleaning the work and

fluxing, charge the bit and run it along the seam slowly, depositing a thin, neat line of solder until the bit requires recharging; alternatively, the solder stick can be held in readiness to charge the bit, leaving the latter in contact with the work; but do not use an excess of solder. Immediately the solder appears to run sluggishly, reheat. Always keep the bit under control. Let the thumb support the handle wherever possible; by this fulcrum, the weight and pressure of the bit on the work can be gauged and adjusted rapidly; this grip also tends to bring the arm away from the body, allowing a free movement and more regulation of the tool (fig. 3).

Another method of soft soldering joints is called "sweating"; it makes a strong job and is suited for joints which have to take a

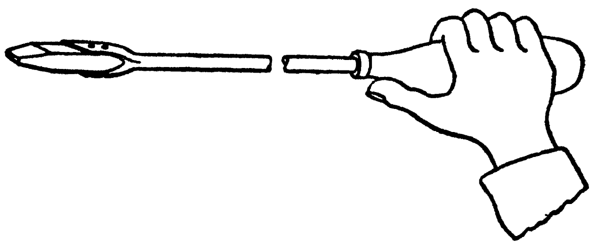


Fig. 3.—Soldering bit and method of holding

considerable load. Tin the whole area of the surfaces to be joined with a thin film of solder (figs. 4, 5); then, placing them in position, apply sufficient heat to cause the tinned surfaces to flow and amalgamate. If the material is fairly thin, a heated bit will usually accomplish this, otherwise a little heat from a gas flame or blowpipe should be judiciously applied. Be careful of any work already finished, as the excess solder may run over it. The attachment of a hinge to an ornamental box is a useful example of this mode of soldering, since it makes a very neat job.

Soldering Aluminium.—If you are trying to repair an aluminium pot, or to make a radio chassis, the following notes may be helpful.

There is no affinity between the usual tin-lead solders and this metal at low temperatures, owing to the thin film of oxide present. Various special solders are obtainable, however, a typical one having 68 parts of tin, 25 of zinc, 3 of phosphor-tin and 4 of lead. Opinions vary as to the best flux. We have found stearin and resin quite reliable, the former especially aiding the free flow of the solder.

A temperature of around 700° F. is necessary for these solders. The work itself also requires preheating near the joint. You will therefore want a gas blowpipe, also a small pair of foot bellows, and of course a gas supply laid on to the workroom. With this apparatus you can also undertake silver soldering and brazing.

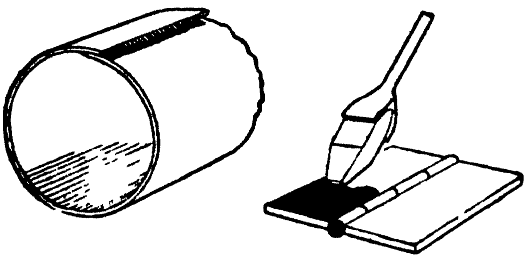


Fig. 4.—A typical soldered joint   Tinning contact surfaces

Blowpipes are obtainable at most ironmonger's; but a simple and effective type can be made for oneself from the notes given at the end of this article. By varying the pressure, different types of flame are produced (fig. 15); it is important to learn and recognize these, otherwise the work may be over- or under-heated. The lever on the blowpipe regulates the supply of gas through the lower pipe; the upper pipe is for air and is connected to the foot bellows. Both connections should preferably be made by flexible metallic tubing. Operate the bellows and practise a little until a flame of constant size is maintained.

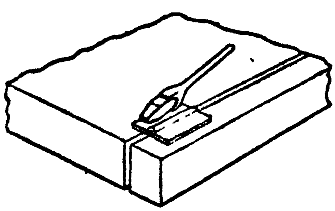


Fig. 5.—Joint assembled and application of heated bit to tinned surface to form union.

After thoroughly scraping and cleaning the joint area, support the work on some heat-retaining substance (asbestos cubes, firebricks or charcoal), and preheat it with a large (not fierce) flame round the joint. Be careful not to overheat; aluminium warps and pits rapidly on approaching red heat. A rough test is to drop a spot of liquid on the work; if it runs off as a globule the temperature is right, if it evaporates the work is too hot. It must be realized that an oxide skin is constantly forming on the work; so at this juncture, and just before applying flux, scrape the heated places with any

convenient tool, such as an old hacksaw blade. Follow immediately by a coating of flux. Next apply solder, a little at a time, using a small pointed flame to melt the stick, the latter being in contact with the work. Run over the deposited solder with a heated bit, so as to give an even spread. Any portion missed must be coated, it being essential to tin all parts of the joint. The joint can now be finally soldered, using a small flame. Run along the tinned surface with the solder, keeping the flame directed upon it as it moves; if the tinning has been thorough, the solder will firmly adhere to the aluminium. In this operation the work should be so arranged that the solder runs downhill. After tinning, it is wise to reheat a little before actually soldering the joint.

Always use a large flame for general heating and a small pencil flame for the actual tinning and soldering.

Silver Soldering.—Although the beginner will not use this method for some time, it is an important process in sheet-metal work, enabling a joint to be made as strong as the parent metal, and it is essential for parts in constant use, such as handles of brass cooking utensils, the pins and hooks of brooches and jewellery; it is also the only method for good-class ornamental beaten copper and silver work, as it will hold up under shaping by a hammer. Silver soldering requires a high temperature, and consequently a blowpipe; here again the work must be clean, the flux suitable, and the temperature correct.

Silver solder is brass alloyed with silver. It lowers the fusing point sufficiently to prevent danger of melting the silver or brass article that is being soldered. You should buy " easy-running silver solder ", in the form of wire 16 S.W.G., with thinner gauges for fine work. Borax is universally used as a flux. Mix it before use with clean water into a thin paste, in any clean receptacle.

It is essential that the parts to be joined should fit as accurately as possible; and it is a truism that the less solder you use, the better and stronger the job.

There are two methods of application. In the first, place suitable pieces of solder on the cleaned and fluxed joint, then generally preheat, then direct a small flame on to the joint. In the second method, feed the solder on to the work after preheating. The first method is suited to joints where solder has to be carried into points that are not directly accessible, such as lapped joints, internal joints in deep articles, &c. Molten solder always has a tendency to run towards the

hottest area, and if its path is chemically clean the process is aided by capillary attraction.

We will now describe silver soldering in a little more detail (fig. 6, 7).

Check the work for accuracy of fitting, making certain that all abutting surfaces are in contact and *clean*; then pack the joint with

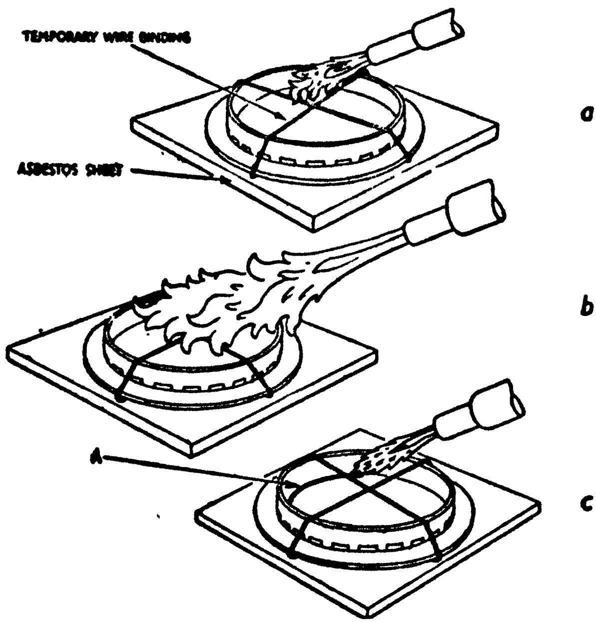


Fig. 6.—Indirect method. Three stages of attachment of ring

a. Application of small soft flame to fuse flux; *b.* General preheating with large soft flame; *c.* Flushing the joint from inside, putting molten solder between joint surfaces as indicated by heavy line A.

asbestos cubes or other refractory materials, to retain the heat. Charge the work with flux, using a small paint-brush, and keep it inside the joint area, otherwise solder may flow out and create an unsightly joint.

For the indirect method (fig. 6), cut the solder up into suitable short lengths, immerse in borax flux, and (handling with pliers) place in position on the previously fluxed work. Some judgment is required in preparing and placing the solder, the total bulk of which

depends on the delicacy and type of work involved. If necessary, set the solder to conform to curves or corners in the job.

Heat is now applied in three well-defined stages. First apply a small flame, to enable the borax flux to harden into a thin film; secondly, carefully raise the job to working heat, using a large but not fierce flame. When the mass of metal surrounding the joint is a dull red, direct a small hot flame on to the joint, so as to enable the solder to flood into the critical points. Bear in mind that the solder will flow to the hottest portion of the work, and the flame must therefore be applied at the parts to be covered and not on the solder itself. If the solder does not flow in a few seconds, it is useless to continue. Either the solder is too bulky for the job or the preheating insufficient.

Particular attention is needed where the work has small projec-

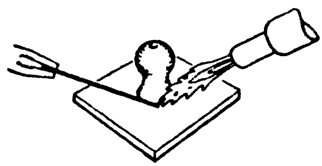


Fig. 7.—Direct method. Attaching knob to cover

tions that are not integral with the main parts. It is obvious that if these are subjected to the same heat as the bulkier parts a partial fusion will result and the job be ruined. Where disproportionate masses occur, such as the attachment of small wire suspension eyes to pendants or wire filigree work to ornamental boxes, these should be heated by conduction rather than directly. When preheating, remove the flame occasionally, to confirm that the heating is proceeding equally. Do not overheat. Bright daylight is very deceptive, tending to show the work as less hot than is really the case.

Similar remarks on procedure apply in general to the direct soldering process, which is particularly adapted to long, exposed joints (fig. 7). A suitable length of silver-solder wire is gripped by the pliers, leaving about 2 in. projecting. The " flow of heat principle " is now taken advantage of. Feed the wire along just behind the flame. The solder will flood to the heated area. If the flame is applied directly to the wire a series of " blobs " will be formed, with excess of solder. When a run of about 1 in. has been completed, repeat the operation. Again it must be stressed that if the solder does

not commence to flow in a very short time it is useless to continue.

Do not attempt to cool the work in water whilst still at working heat, or distortion will probably result. It may be necessary, in types of work that are not self-supporting, for the component parts to be temporarily wired together before starting to solder.

Although not easy, silver soldering can readily be mastered by care, attention to details, and cleanliness; but it is not advisable to attempt soldering valuable materials until experience has been gained with the baser metals, such as copper or brass.

We have said a great deal about joining, because it is the most essential part of the metal-worker's art. Let us now apply this knowledge to the manufacture of a few simple articles.

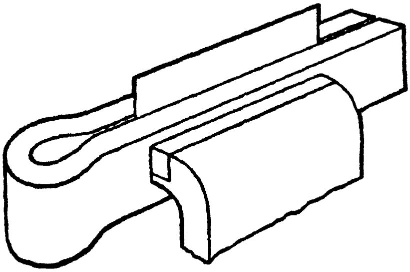
MAKING A BOX (fig. 8)

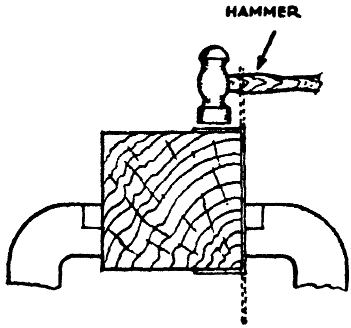
The following method gives a strong and neat job and applies to boxes of various sizes. Use fairly stout sheet, say 21 or 22 S.W.G. Fig. 8 shows the shape of the blank, the dotted lines representing the necessary bends. All edges are folded, to give stiffness and finish. This operation is facilitated by using a folding bar, although it can be carried out by bending directly between the vice jaws; such a bar can be forged at small cost, and its mode of use is obvious. It will be found easiest to bend the edges of the blank first, then bend the two ends, then the soldering tags, and finally bring the sides up into position. For this last operation a hardwood bending block is necessary. It should be cut a little shorter than the internal length of the box. Bending blocks from any hardwood will be found invaluable on numberless occasions for forming and bending in constructional metal-work. The box is completed by soldering the tags in position. Complete the lid in a similar manner, folding the edges first; a run of solder applied externally to each corner will complete it.

It is important that the lay-out and bending of both lid and box should be accurate, otherwise they will not fit.

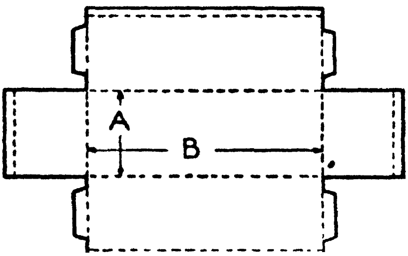
A NEST OF DRAWERS

Fig. 9 shows a useful nest of drawers for entomological specimens, birds' eggs, &c. It is easy to make, provided that the essential measurements are carefully marked out and the body containing the drawers is square. The dimensions suggested—8 drawers 2 in. by 6 in. by 6 in.—can of course be varied to suit your taste.

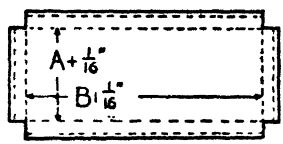

Use of folding bar



Bending with hardwood blocks



Blank and bending lines of box



Blank and bending lines of lid

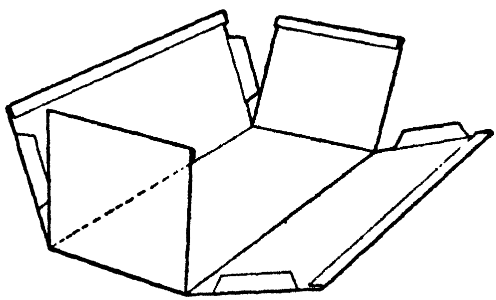

Method of assembly

Fig 8.—Making a box

Complete the frame or body first. The front edges should be double-folded for stiffness; use sheets 18 or 20 S.W.G. thick. After folding the edges, tackle the main bends, using a folding bar if possible. Assemble the two bent halves, and solder them together. Four angle corner pieces are also soldered and copper-riveted on, to give reinforcement. It is important that all corners of the body be square, otherwise you will have trouble when fitting the trays.

The internal partitions are now soldered in place, starting with the central one; their front edges are also folded. The cross pieces are cut and fitted to suit, then soldered in place; keep them parallel from front to rear, to permit close fitting of the drawers. The back is now fitted, being sheet metal of the same gauge as the sides, the rear tags folded over on to it, and the whole completed by a seam of solder. The internal bracing afforded by the partitions will make the whole assembly quite rigid.

The trays are constructed on the principles already explained for box making, the top edges being finished with a single fold. A small tag should be soldered to the front of each tray, to hold a brass curtain or split-ring handle.

The doors are now constructed as shown, using a folding bar and an appropriate piece of hardwood. This folding must be accurate, as the whole appearance of the job will be spoiled otherwise. Small angle pieces are soldered internally to the corners of each door. Now place the doors in position, checking the general fit, and correcting if necessary. Next, solder the hinges into position. Small brass hinges, procurable at any hardware dealer's, will do quite well. Small copper rivets are also advisable. They should be heated and fed through the holes in the door frame and those in the hinges, then hammered over.

A coat of enamel will complete the chest.

A WATER MOTOR (fig. 10)

This is an excellent practical toy, giving sufficient power to drive the average Meccano working model.

The best medium is sheet brass, as tinplate will rust on the cut edges. The casing comprises three pieces of sheet 18 or 20 S.W.G. thick, i.e. two sides and an external spacing piece.

First cut the sides approximately to size, and file to final shape. A small piece of brass rod of any convenient diameter, and about

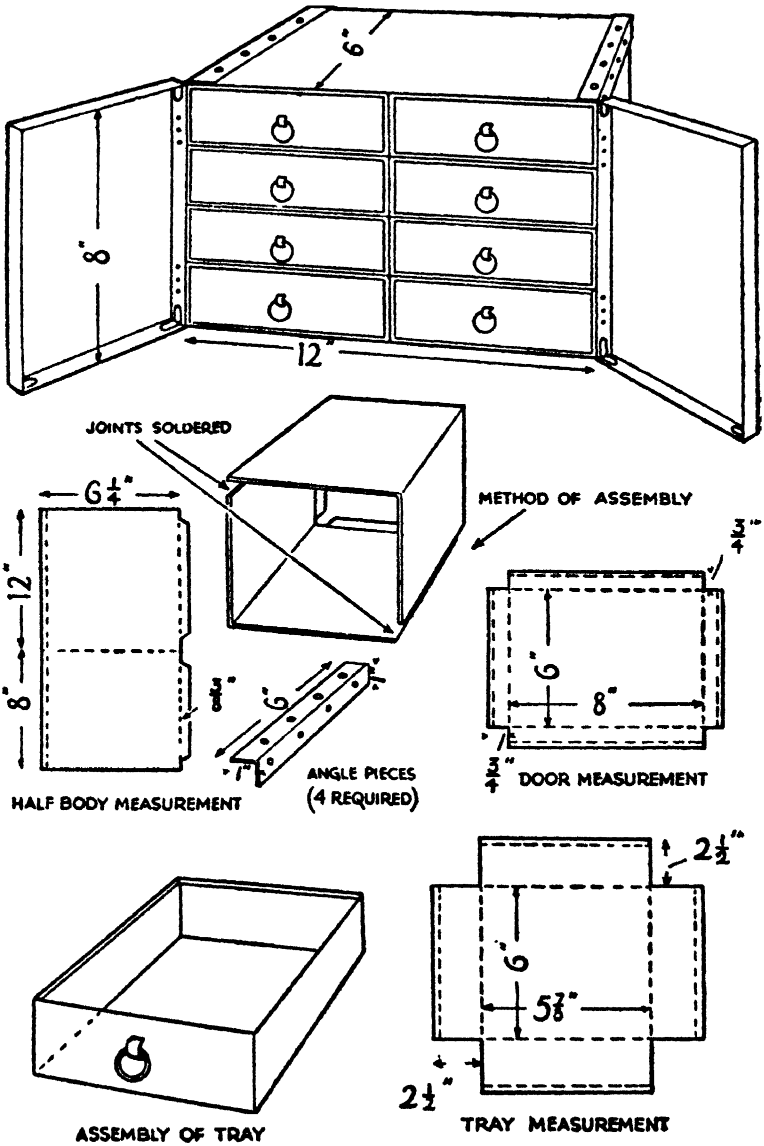


Fig. 9.—Making a nest of drawers

$\frac{3}{16}$ in. long, is soldered where shown, to form a boss for the impeller wheel bearings. The spacing piece is now cut to shape, bent to conform to the sides, and tack soldered to one of them at a few points; complete the joint by running a fillet of solder right round the internal angle. Four small angle pieces should now be prepared and soldered into the positions shown. Next place the remaining side in position. You will of course already have drilled the boss and this side to take the impeller wheel spindle, the latter being $\frac{1}{8}$ in. diameter. Pass the spindle through these holes, to ensure that they are in alignment. Now drill four $\frac{3}{16}$-in. diameter holes in the loose side, carrying the drilling through the projecting lugs of the four angle pieces. It is advisable to support the latter with small pieces of wood whilst drilling, otherwise they will inevitably bend down under the pressure of the drill. Clamp each lug with a No. 2 B.A. bolt and nut as drilled. Now check again the free running of the spindle; if it is at all stiff, extract it and pass the $\frac{1}{8}$-in. drill through both bearings while the case is still assembled. Remove the loose side, and complete the lugs by placing in them No. 2 B.A. bolts with the heads inwards; these must be tinned and then soldered in place. The case is completed by drilling four holes in the bottom flange for connection to the base-plate.

We now tackle the impeller wheel. Two 5-in. diameter brass discs are required, the same thickness as the casing; they should be cut with shears and finished by filing. A hole $\frac{1}{8}$-in. diameter is drilled through the centre of both. Now cut the impeller blades and bend them as shown in the sketch. They should be about 22 S.W.G. thick, and 16 are required. Mark one of the discs into sixteen segments, and secure the impeller blades to it by soldering at two or three points. It will be observed that the inner edge of each i[illegible]r blade finishes between the segments. When the blades a[illegible]y attached to one disc place the other in position, insert t[illegible]ndle through the two central holes, and tack solder the blades [illegible] two small spots of solder near the end of each blade shoul[illegible]ce. Finally, complete the impeller by soldering the spindle in [illegible]he [illegible]ion.

The jet now has to be made and assembled in the casing[illegible]ain a piece of $\frac{1}{4}$-in. bore copper or brass tubing about 2 in. l[illegible]nd squeeze the end in the vice until an elongated orif[illegible]e is [illegible]ed approximately $\frac{1}{8}$ in. wide; this will give a powerful [illegible] in[illegible]ing on the maximum width of the blades.

The positioning of the jet requires some care. Re[illegible] th[illegible]oose

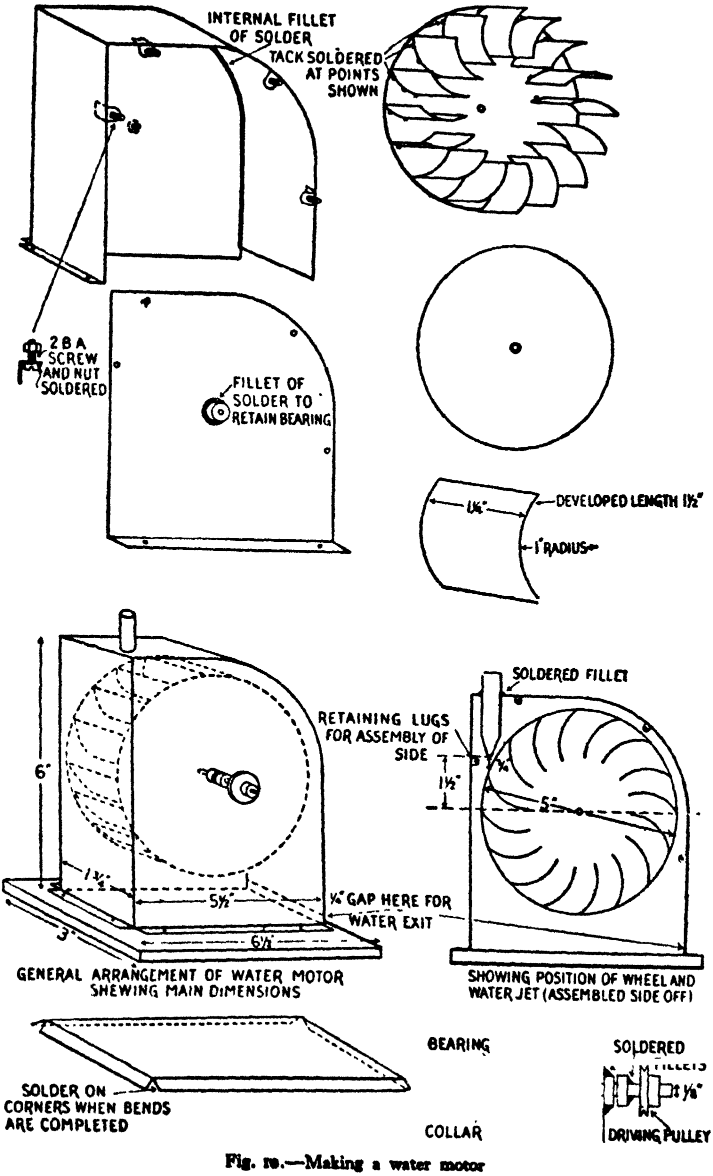


Fig. 10.—Making a water motor

side of the casing and place the impeller wheel in position. The correct centre for the jet hole can then be lined off ⅜ in. from the outer edge of the wheel. Use the largest drill available, and open the hole to size with a half-round file. When the jet is soldered in position, the orifice should be between 1½ in. and 1¾ in. from the horizontal centre line of the wheels.

The final assembly stage has now been reached. Place the impeller wheel in the casing and bolt the loose side on, using No. 2 B.A. nuts. Centralize the impeller and secure it by two collars, one being soldered on to the spindle on each side of the casing. It only remains to bend the base-plate and drill it to suit the clamping holes in the case. A length of rubber tubing for connection to the water-tap, and the water motor is complete.

DOMED BIRD CAGE

This makes an excellent piece of elementary wirework, besides providing a handsome home for one's pet bird. The measurements given (fig. 11) are for general guidance only; if varied, however, you should remember to keep the proportions such as will give a pleasing shape.

The frame is of copper or brass tubing, the four corner pieces being ½-in. O.D. and the cross members ⅜-in. O.D. (See fig. 11*a*.) The ends of the latter are filed to fit the shape of the corner posts.

The two side assemblies should be made first, using silver solder. They should be temporarily wired after fitting; then the remaining four cross members are fitted and the complete frame wired together ready for final soldering. (See fig. 11*b*.) It is a wise precaution to renew the original wire binding on the side members, as the remaining joints are rather near the joints first completed, and the heat of the final soldering may tend to soften them, resulting in misalignment. A reasonable squareness in the finished frame is of course essential. The frame is now trimmed up, surplus solder and flux being removed with an old file.

The upper cross members must now be drilled, a somewhat tedious operation with a hand drill, but essential for securing the wires of the dome and cage. A 3/64-in. drill is required. Reduce the positive lip of the drill with an oilstone; this stops the tendency of the drill to bite in which is so evident when drilling copper or brass.

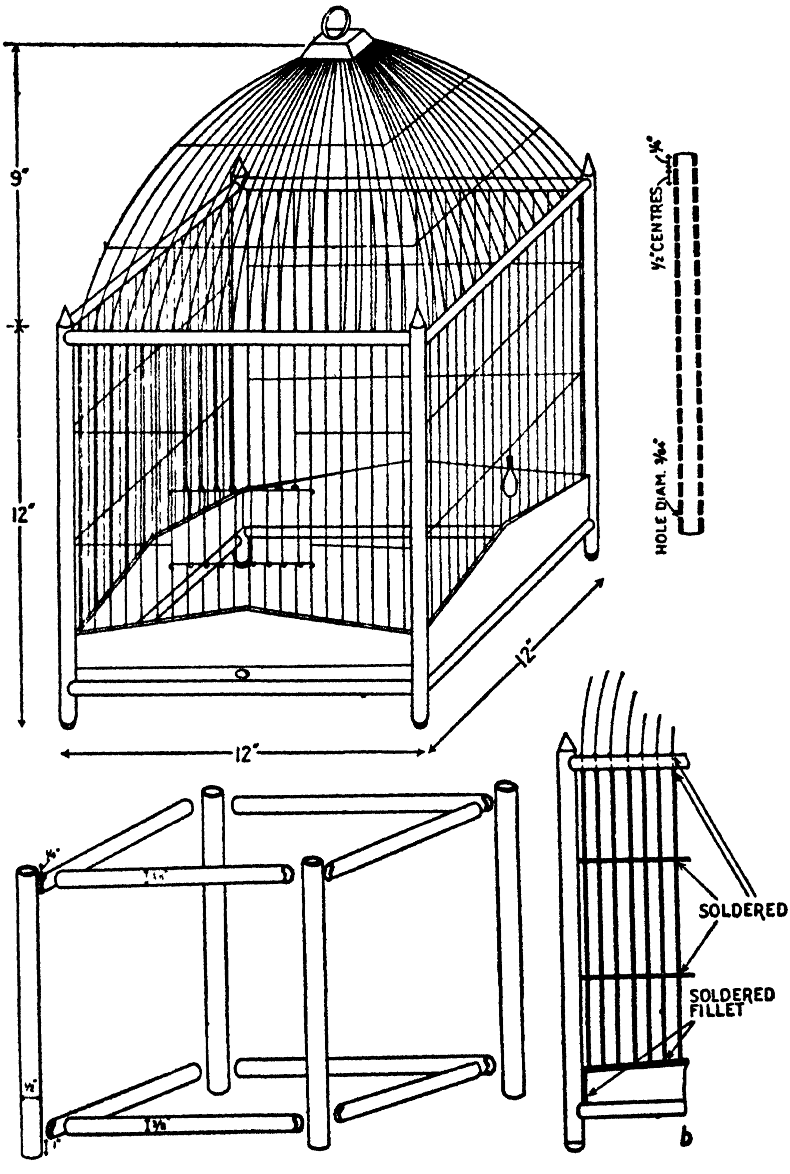


Fig. 11.—Making a domed bird cage

Use paraffin as a cutting lubricant and employ the greatest speed of which the drill is capable. Starting ¼ in. from one end, the holes should be spaced ½ in. apart, and continued completely through the tube (see fig. 11*c*).

The conical caps and domed feet are now soldered on, using soft solder (fig. 12). These fitments are quickly turned from a piece of ½-in. copper rod; but if you have not access to a lathe, they must be shaped on the bench.

Four panels come next, using 16 S.W.G. brass or copper sheet. Cut each plate and bend it to the measurements shown, so that it will fit snugly between the uprights. The upper edge is turned over at a right angle and 3/16 in. wide; it must be drilled on the same centres as the cross members. One panel should be ½ in. narrower, vertically measured, to allow for the bottom tray of the cage. The panels can next be soldered into position with a fillet of soft solder round the inside, where they abut on the frames, except of course on the side where the tray will be.

Wiring can now be commenced. The bulk of the wire should be No. 18 S.W.G., half-hard, but the stiffening cross wires must be slightly heavier, say 12 S.W.G. Cut the wire into the required lengths from the coil. They will require straightening, which can best be accomplished by lightly tapping them with a mallet on a piece of flat hardwood. Apply a small portion of flux (killed spirit) to each end of the wire; then thread the wire through the upper cross member into the holes in the bottom panel. Using a minimum of solder, form joints at the points shown, i.e. where the wire enters the cross member and under the side of the panel edge. Work completely round the cage in this manner, making certain that the wires are straight, as it is difficult to correct any kinks or imperfections once they are in position. The cross wires can now be attached. To do this effectively and quickly, work on one side at a time, placing a spot of flux on the vertical wire where the cross wire is to touch; then solder on, using a minimum of solder on the bit.

The construction of the sliding wire door is shown in the detail (fig. 12). The small loops forming the slides can be made with round-nosed pliers. Next, water and feeding holes are constructed on opposite sides, as shown.

The wires comprising the dome are set to the required arc after rectifying bends and kinks. It is suggested that the radii be scribed

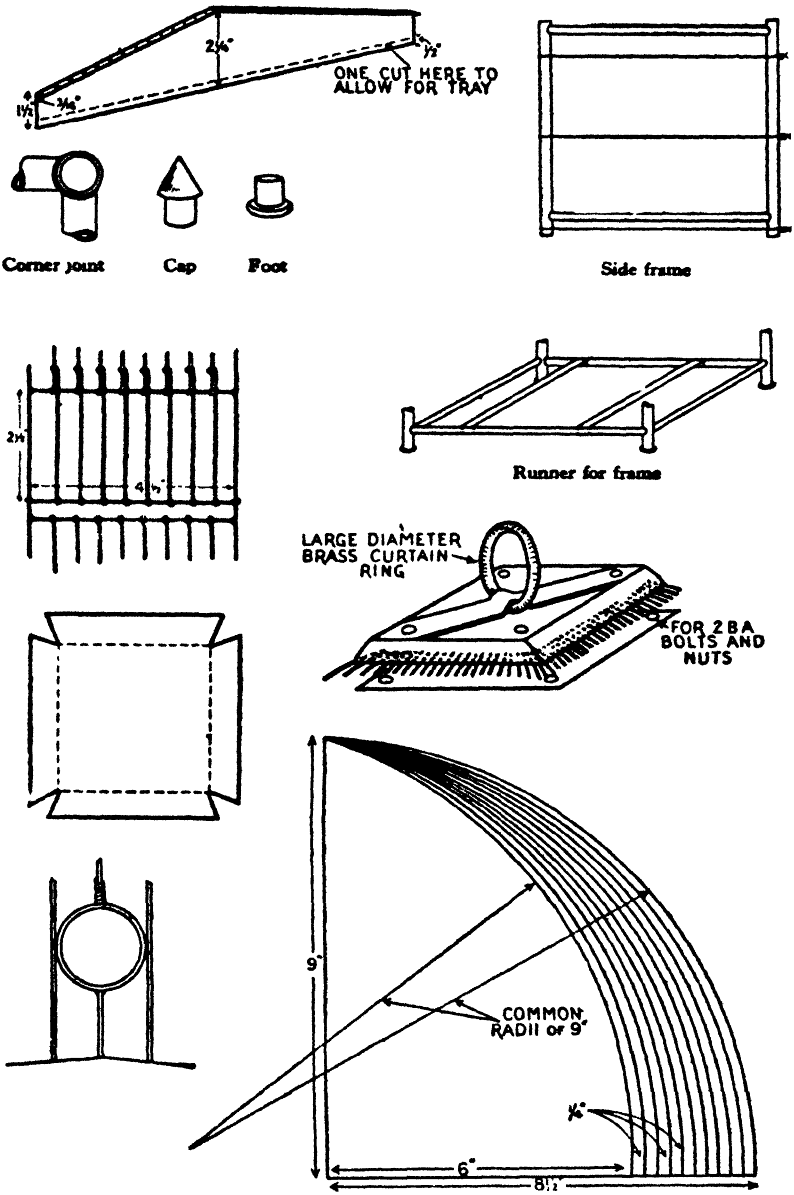


Fig. 12.—Making a domed bird cage—continued

with the dividers on a piece of smooth wood and the wires formed to this curved outline. The lay-out in our drawing (fig. 12) shows that eight sets of wires will be required from each radius, each extending from the corner of the cage to the centre of the cross members, the largest radius being at the former point. When completed to this stage, the wires can be soldered into position.

The top fitment, which also holds the suspension ring, is bent from a piece of sheet 16 or 18 S.W.G. It is then drilled at the corners, to receive four No. 2 B.A. brass screws. A flat piece is cut and also drilled in alignment with these holes. This assembly will

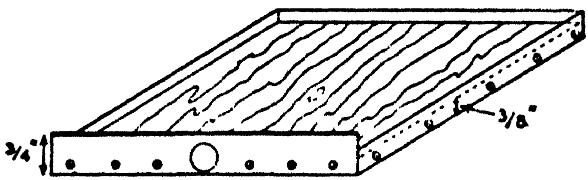


Fig. 13.—Sliding tray

securely clamp the dome wires into position, and the cross wire can then be soldered in place in the manner already described.

The sliding tray (fig. 13) may be made either of plywood or of sheet metal heavily enamelled. Its front comprises a flat piece of copper or brass with the upper edge folded over. If metal, it will be part of the tray; if the tray is of wood, it can be secured to the latter by brass screws with countersunk heads. The finished front should be sufficiently large to overlap the front panel slightly. Add a brass ring or knob for withdrawing the tray. Two strips should be soldered across the bottom cross members, finishing flush with the top of them, to form runners for the tray. This completes the job, except for polishing the whole of the metal-work and applying a good coat of lacquer, or alternatively enamel. Some form of good non-oxidizing finish is very necessary to prevent any trace of verdigris, as the latter is highly dangerous to bird life.

Two or three wood perches should be fitted in the cage, likewise a swing perch suspended from the dome. The water and food troughs are best in white porcelain.

MAKING ONE'S OWN BLOWPIPE (fig. 14)

This essential item for silver-soldering, annealing, and general work at moderately high temperatures can be cheaply constructed from standard materials.

The blowpipe or burner is built up from standard pipe fittings as shown in fig. 14. They are cheap enough for two sizes to be made, the smaller one for fine work only. The air pipe is screwed

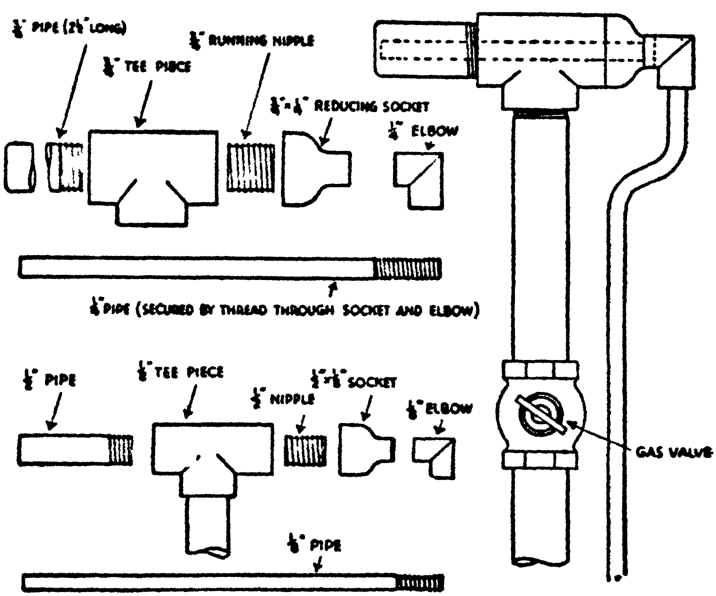


Fig. 14.—Blow-pipe assembly and details

into both reducing socket and elbow, in that order, and should finish about ⅛ in. shorter than the gas pipe at their mutual orifice. Screw all joints tightly, dressing the threads prior to assembly with a fairly stiff mixture of red lead powder and linseed oil. The gas supply can be regulated by the valve fitted into the supply pipe. Any local plumber or hot-water fitter will supply the short piece of piping required, and also the fittings, and for a moderate charge will cut and thread them where necessary. The soldering hearth can be assembled from standard firebricks, supported on any convenient stand or even

on a corner of the bench; but where the base is of wood it is essential to place a sheet of asbestos board beneath the hearth. A quantity of charcoal will be found extremely useful for packing various articles in order to retain their heat whilst operations are in progress. The only item that needs to be obtained ready-made is the foot bellows; you must have this in order to maintain a constant supply of air.

Types of Gas Flames (fig. 15).

Pencil flame: A small flame, with minimum gas and air. Useful for thin sections and small silver-soldered joints after previous pre-heating.

Medium flame: Used for flushing silver-soldered joints and pre-heating small work. Use about half the total available gas supply, but little air.

Small intense flame: For flushing larger joints and heating thicker sections for bending under heat. Use about half total gas supply and considerable air.

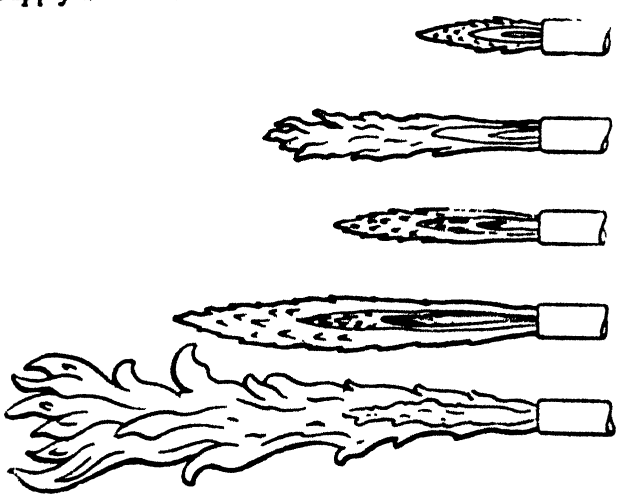


Fig. 15.—Component sizes of blow-pipe for small work

Large intense flame: For largest silver-soldered work and brazed joints. Use full capacity of air and gas.

Large soft flame: For preheating bigger work and general annealing of thin sheets. Use largest gas supply, but little air.

WOODWORK

TOOLS

The following list of tools looks formidable, but remember that they are not all needed at once. Some work will require the minimum number of tools, and with a little ingenuity a few tools may be made to serve many purposes. The first essential thing is a strong desire to make something in particular, and it is surprising what can be done with the minimum equipment. With a saw, a file, and a penknife many perfect models can be made. As your ambitions grow, so will the size of the work you undertake. This kind of work calls for real craftsmanship if the finished article is to be all that you desire. Good work calls for good tools, and the suggestion is that you gradually build up a first-rate kit of tools, not waiting until you have a definite need for a certain tool, but planning ahead, so that when the need arises, the tool required is there ready to be used. Remember that the greater the number of tools that you possess the greater will be the number of operations that you can perform. A good craftsman may work very well with poor tools, but I have yet to see a good craftsman with poor tools; so buy the best possible and you will be repaid many times over by good service. Build your kit intelligently; buy the essential tools first, then add those little luxury tools that are the pride of the real workman. A tool in your cupboard is as good as money in the bank; they both pay excellent dividends.

Tenon saw.
Hand saw.
Jack plane.
Try square.
Steel rule.
Marking knife (penknife).
Gauge.
Chisels: 1", ¾", ½", ¼".
Hammer.

Vice and bench.
Bench hook (see page 601).
Fretsaw table.
Screwdriver.
Bradawl.
Pincers.
Oilstone and oil.
Spokeshave.
Coping saw.

Brace and bits of various sizes; centre are the best.

Drills used for metal are most suitable for screws and are reasonably cheap.

Carving tools are purchased as required, together with a slipstone to sharpen them. The type of carving you undertake will dictate the type of tool you require. Some of the most useful ones that I possess have been made from old files, softened and shaped, then rehardened and sharpened.

TAKE CARE OF TOOLS

It requires considerable skill to sharpen a chisel or a plane iron but very little to blunt them, so having carefully sharpened them, take great care to preserve the cutting edges. Remember that even the best craftsman cannot work with blunt tools. A drawer into which everything is dumped is not the ideal receptacle for sharp-edged tools. Some form of rack is essential to protect them, and if the rack can be placed in a convenient position, so that everything is within easy reach, so much the better. The old-fashioned tool chest still has many adherents, but it is certainly out of date unless you have to carry your tools about with you. The tool cupboard described later is definitely more useful and very much more convenient and practical, and by hanging it on the wall over your bench it does not take up any room either on your bench or the floor and is in the most accessible spot possible. By careful planning it will hold all the tools you are likely to possess; it is neat and compact and will protect them from damage. Form the habit of replacing each tool after using it. You will then know where everything is and work will not be held up while you search the house. When you have finished working, it is then a simple matter to lock the tool cupboard door and everything will be in its place.

If you have neither the time nor the material to make such a tool cupboard, a long rack fixed to the wall or the back of the bench is the next best thing. Tools that are to be left for any length of time without being used should be greased all over with either vaseline or thin oil to prevent rust and preserve cutting edges.

HOW TO SHARPEN TOOLS

The following description of the process of sharpening is applicable to all tools used in woodwork that have cutting edges. For the purpose of sharpening, a medium stone is the most useful; later you will probably add to your collection a rough and a very fine stone, the former to facilitate the removal of badly snipped edges when a grindstone is not available, and the latter to give that extra sharpness which is so essential to delicate work and particularly needed when the wood is soft and spongy. Remember, too, that the sharper the cutting edge the less manual effort you will have to make when using it. A bottle of sweet oil and a piece of waste or old rag on which to wipe the tools when finished, complete the equipment for sharpening. Later, when you add carving tools and gouges to your kit, a special stone will be required, called a "slipstone", in order to sharpen them. A slipstone is a thin stone curved on the edges to fit the curve of the gouges.

When you purchase a chisel you will notice that it is ground at the cutting end; this long grind is known as the grinding angle and, to be technical, is 25° to the face of the chisel. To sharpen, allow a few drops of oil to fall on the stone from the can containing the sweet oil, then hold the handle of chisel in the right hand and place chisel on the stone so that the grinding angle is flat on stone; the fingers of the left hand are now extended and placed firmly on the back of the chisel to hold it in place.

The actual sharpening is now done by moving the chisel backwards and forwards; this is made easier by lifting the handle slightly, thus presenting less of the chisel to the stone and making what is known as the sharpening angle. The amount of rubbing required will depend on the condition of the existing edge. Always remember to rub the chisel the full length of the stone; if you don't, you will soon make the stone so hollow as to be almost useless. The knowledge of how long to rub comes by practice. Using a piece of rag, wipe away the oil picked up from the stone, then move your finger carefully down the face side of chisel towards the cutting edge, which, if done sufficiently, will be slightly turned up, making what is known as a "wire edge". Remember to rub your finger from the safe side of cutting edge if you wish to keep your finger intact. The burr or wire edge must now be removed by turning the chisel over

and rubbing it backwards and forwards along the stone, at the same time holding it absolutely flat. The slightest angle on this side will prevent the chisel from being used properly, and the results will not be so good. In this process, to remove the burr the chisel is best held flat and at right angles to the length of the stone by holding the handle of the chisel in the right hand and pressing the back of the chisel downwards with the fingers of the left hand, at the same time moving it backwards and forwards with the left hand. A few rubs should be sufficient to remove the burr; if it appears to be taking too long, repeat the first process again and follow with the second. Test for sharpness by using the chisel to cut a scrap piece of wood across the grain. Never use a finger or thumb for this purpose if you value them. A plane-iron is sharpened in exactly the same way. To remove iron from plane, hold the plane securely in the left hand by the body of plane and not by the handle, then strike the button on the toe at front end of plane sharply with a mallet—a sharp blow is generally sufficient to loosen the wedge holding the iron in place. Remove wedge and iron, then notice how the back-iron is screwed to plane-iron. This must be removed before the iron can be sharpened. After sharpening, replace back-iron in exactly the same position as before, leaving the cutting edge of plane-iron projecting about $\frac{1}{16}''$ beyond the edge of back-iron.

To replace iron and wedge, hold the plane in left hand in such a position that you can see down the bottom of plane, then replace iron with the right hand until the cutting edge can be seen just projecting through the mouth of plane; the wedge is now pushed into place and finally driven home with a mallet. To test the plane it must be tried on a scrap piece of wood. If at first it fails to take off any surface of wood, it is because the iron is not projecting sufficiently. Tap the top end of iron gently with a hammer and try again, tapping and trying until correct. If the plane is cutting too much off, it is because the iron is projecting too far. This is made to retreat by holding the plane in the same way that it is held in order to remove the iron entirely, and a sharp blow is given to toe. Always remember to drive wedge securely into place before planing.

The process of adjustment is very simple really, and a little practice is all that is required. If you value your plane, do not use it to remove paint from old wood; also, pull out all nails and screws likely to catch the iron. If they cannot be removed, see that they are driven well below the surface of the wood.

Gouges are sharpened in a similar way, except that the gouge is held firmly in the left hand while the right is used to move the slip-stone backwards and forwards, and at the same time from one edge to the other, thus covering the whole of the edge and not just the part where the stone fits. Another way is to hold the stone in the vice, taking great care not to apply too much pressure, then rub the gouge along the edge of the stone as you would a chisel, removing the wire edge on the flat stone by rocking the gouge as it is moved along.

Gouges which are ground on the outside curve, such as carving tools, are generally sharpened on the flat stone, the burr being removed by using the slipstone.

It is never wise to attempt to sharpen a saw yourself; it costs so very little to have it sharpened by an expert, and it is so easily ruined unless you have really studied the technique. Even then I do not advise you to practise on your best saw. If you must do everything yourself, get hold of an old saw to work on; then, having mastered the process, you can sharpen your good ones.

Spokeshave blades are sharpened in a similar way to plane-irons. In the case of wooden ones, the tangs on the blade make it necessary to use the narrow side of the oilstone in order to sharpen the blade successfully.

HOW TO USE TOOLS

There are a number of essential processes which you must master before any real work can be accomplished—planing, marking out, using a gauge and try-square, sawing and chiselling. Master these and the rest is easy.

As planing is almost the first operation necessary to prepare a piece of wood for further use, we shall discuss the method of using the plane first. We shall presume that you have already sharpened it and have a suitable table or bench on which to work. The first thing you require on the bench is a stop against which you can place your piece of wood in order to prevent it moving when being planed. On a proper bench a hole is generally cut right through the top into which is inserted a suitable piece of hardwood which can be knocked up as the top gets planed away or generally worn. Always try, however, to keep the stop just below the surface being

planed; being end grain and hardwood, the jar it gives the plane does not do the edge any good. As a substitute, a strip of wood less than the thickness of the wood being planed can be screwed to the top of the bench, but see that the heads of the screws are countersunk well below the surface, just in case the plane should catch it. Having fixed a stop, place the piece of wood hard against it, and take hold of your plane in your right hand and at the same time grip the front of the plane firmly in your left hand with the thumb of your left hand on the side of plane nearest to your body; this is shown in fig. 1. The front of the plane should be resting on the wood with the cutting edge not quite on it. The plane is held flat by pushing the left elbow forward. The right hand at this stage is quite relaxed. Fix your feet firmly apart, left foot forward, then without moving the body push with your right hand. You will notice that as the plane moves forward the pressure on the front of the plane moves to the back. This is essential if the surface is to be kept flat and straight. If the wood is wider than the plane, start at one side and work your way across, trying to take the same amount off all the way. Once you have the surface smooth and clean test it with your steel rule in all directions, then remove only the parts that stand high. It is customary to mark the first side so that you can take all your future measurements from it.

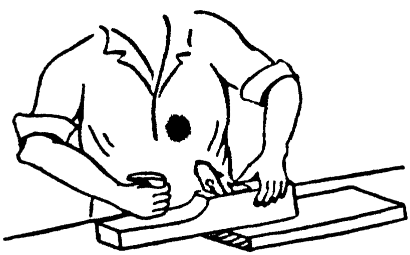


Fig. 1

To plane the edge it is necessary to have something to hold the piece of wood vertical. The vice is the best tool for this. Failing a vice, get someone to hold the end for you, then plane in the usual way. Narrow pieces of wood can be planed against the bench stop. Having planed it flat and straight, there is another test which you must now apply to find out if the two surfaces you have planed are at right angles to each other. This is done with a try-square, held so that the angle formed by the blade and stock fits over the two sides being tested. If it fits correctly the edge is marked, so that you can square all future lines drawn at right angles to the edge, from this particular edge. (See fig. 2.)

At this stage, it is necessary to use a gauge in order to draw a line parallel to the planed edge and the correct distance away. The gauge consists of a stock, and a stem carrying a spur or a pointed nail. The stem is movable through the stock and held rigid at the required size by means of a screw. To set, move the stock until the distance between it and the point is the size you require, then screw tight. Always check your measurement after tightening the screw; the stock has a habit of slipping. In operation the gauge is held in the right hand as illustrated in fig. 3 and pushed away from you,

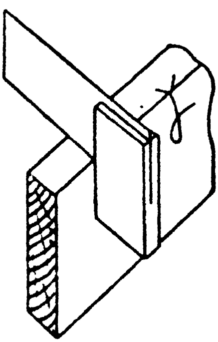


Fig. 2

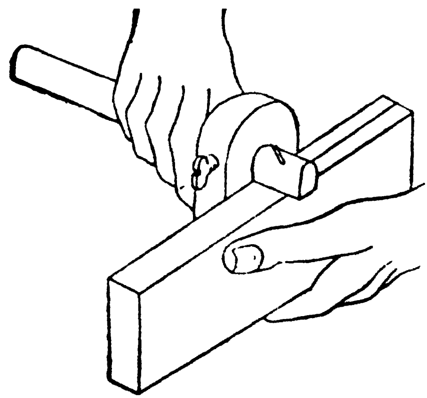


Fig. 3

keeping the stock flat against the side down which it is moving. If the spur is held at a slight angle to the wood, so that the effect is a trailing scratch and not a digging one, the movement is very much easier. This tool is one of the most difficult to use at first, but persevere; you will soon find how simple it is to use in reality and how much quicker and more accurate it is than using a rule to draw the required lines. Having gauged for width, you then plane to line, then gauge for thickness and do the same. The four faces of the wood are now planed and ready to become part of the job in hand.

Sawing the piece of wood to the correct length is the next operation. To do this you must first of all draw a line at right angles to the face edge across the face side by means of a try-square and pencil, leaving sufficient waste at the end to make sawing possible; nothing less than ½" will do. From this line you measure the length you want and, again using the try-square, draw the line right across.

In using the try-square see that the stock is held firmly against the edge (as illustrated in fig. 4) by the left hand, leaving the right hand free to draw the necessary line. Having marked the lines with a pencil, the next stage is to cut them with a knife. This cuts the

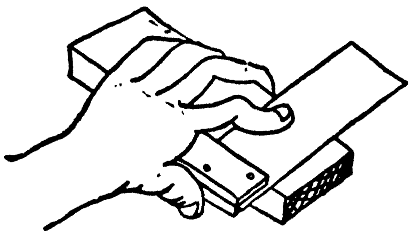


Fig. 4

top fibres and preserves the line when the waste is being sawn off. A penknife is suitable for this purpose, but remember that for cutting you must use the try-square as well. It is never successful if you use a rule; the rule will slip all over the place.

The waste ends are now sawn off with a tenon saw. Place your bench hook firmly in position on the edge of the bench, hold the

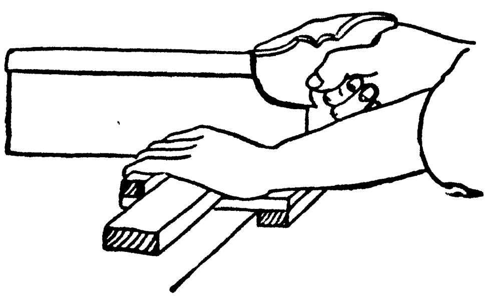


Fig. 5

piece of wood being cut hard against the back stop with the left hand, leaving the right free to use the saw. (See fig. 5.) The line on the wood should be level with the end of the stop and the waste on the right-hand side. Hold the saw in the right hand in such a way that the teeth will rub against the end of the stop; this acts as a guide and prevents wear and tear on the left thumb. Your chief occupation in the process of sawing is keeping the saw to the line and vertical, a by no means easy task. A point worth noting here is

that the longer you take to saw, the smoother will be the end; as the teeth cut through slowly they damage the fibres less, and instead of tearing the wood apart, you have a nice clean cut.

Chiselling is invariably done in either of two directions, across the grain or with the grain of the wood. Chiselling with the grain is generally done with the chisel held in a horizontal position, the piece of wood to be cut being held securely in a vice. To chisel in this way, hold the handle of the chisel in the right hand and let the fingers of the left hand rest flat across the back of the blade; at the same time rest the left elbow comfortably on the bench. The blade is moved in the direction of the grain as illustrated in fig. 6. In practice, all horizontal chiselling resolves itself into cutting away triangular sections. Don't try to cut it all away at once by chiselling along the longest side. Start at the apex and gradually work your way towards the finishing line.

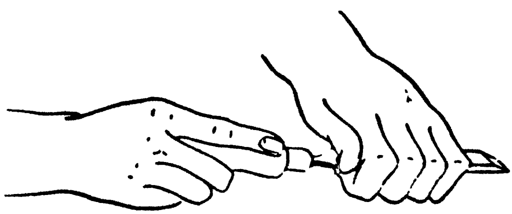


Fig. 6

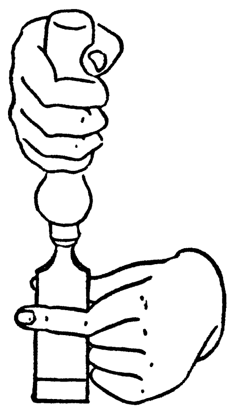


Fig. 7

When chiselling across the grain the chisel is held upright and the cutting action is downwards. A scrap piece of wood underneath the piece being chiselled preserves the top of the bench. Hold the chisel upright by grasping the handle in the right hand, using the clenched left hand to hold the wood in place, while the first finger is used to direct the cutting edge. (See fig. 7.) By leaning over the chisel with the right shoulder, greater leverage is obtained, and if the chisel is moved slightly sideways during the downward cutting stroke the result is much smoother and the operation made easier. The action is that of shearing or like cutting with shears. Your eye should be in such a position that you can easily see if the chisel is upright; this is very necessary if you wish the edge to be square and true.

The spokeshave is a very useful tool to possess, but requires some explanation as to the best method of using it. The general principle of the spokeshave is similar to that of the plane; it has a cutting tool firmly held between two handles for easy manipulation, and its chief use is on curved surfaces. For outside curves the face of the spokeshave is flat; for inside curves or hollows the face is rounded. To use it, grasp it firmly in both hands with the first fingers of each hand pressed on the part that carries the blade, with the thumbs pushing at rear. The hold should be comfortable but secure. Remember, you are shaping the wood, not the spokeshave. (See fig. 8.) Next you must understand something of the nature of the

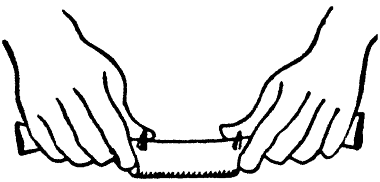


Fig. 8

grain of the wood, for the spokeshave must follow it if you wish the surface to be smooth. The extreme curve is a circle such as a wheel. In such an object there are four directions in which you must spokeshave. By drawing a line through the centre of the wheel and with the grain then directing this line at right angles through the centre, you divide the circle into four quarters. Now notice which way the grain goes, and you will see that in order to spokeshave correctly you must go from the short grains to the long, that is, you must spokeshave each quarter in a different direction. Always push away from your body and direct the spokeshave through an arc of a circle.

HOW TO MAKE JOINTS

There are four essential joints that must be understood and which you must be capable of making before any useful structure can be attempted. They are the housing, lap halving, mortise and tenon, and dovetail, together with their alternatives to be used where necessary.

Housing Joints.

As the housing is the simplest, we shall discuss this joint first. It is generally used when the strain is at right angles to the joint, it having very little strength in the opposite direction. The exception to this is when the joint is made in the form of a dovetail; this, however, requires a great deal of skill in the making and is not very often required. This joint is mostly used for such things as shelves and is considered the correct joint for this purpose. Through housing (fig. 9) is used when the exposed joint is not an eyesore.

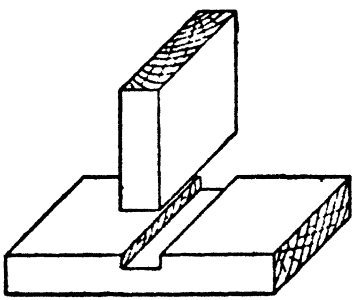


Fig. 9.—Through housing

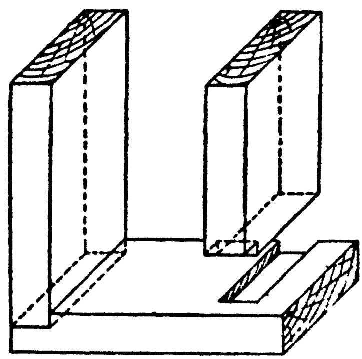


Fig. 10.—Lap and stopped housing

Generally speaking, however, for most furniture the stopped housing (fig. 10) is the more popular, as this leaves the front edge quite clean. The lap housing (fig. 10) is used as a rule for boxes; the top shelf of any construction where a simple joint is required to take only a vertical or downward pressure, like the top shelf of a bookcase that may carry, say, only an ornament or clock. It is also a useful joint in model making and is used very frequently for this purpose. The only tools required to make a housing joint are a tenon saw, chisel, gauge and try-square. In the through and lap housing the work is all on one piece of the material. The secret of making a good joint is obvious: the trench must be cut out accurately. Using the try-square, mark the trench out exactly the right width, which must be the exact thickness of wood to be inserted. The best way to do this is to place the try-square along one line, then hold the piece to be fitted against the blade of the square and mark the thickness with a knife. After removing the shelf, check both lines with

the try-square to make quite sure they are square with the edge of the wood. Having marked out the trench across the face of the wood, square these lines down the sides or edges, then gauge for depth of trench between them. A quarter of the thickness is ample for this purpose. To remove waste, make two saw-cuts right across, keeping on the waste side of lines and cutting right down to the correct depth as shown by gauge lines. Then hold the wood firmly by using vice or clamps, and chisel in a horizontal direction, resting the wrist of the left hand comfortably on the wood being cut. In chiselling, don't cut straight across but work upwards, removing, like a wedge, the waste part. When you have reached the line turn the wood round and proceed in the same way, gradually working straight across, and making the bottom of trench perfectly flat. Test joint by fitting the pieces together. If the joint is too tight, remove a little from the sides of trench with a wide chisel, but be very careful not to remove too much or you will make the joint loose. If very little is required to be removed, it is sometimes advisable to plane the end of the piece that fits into the trench. Whichever process you use, great care is needed to prevent the removal of too much; remember, it cannot be replaced. The stopped housing is a little more complicated: the trench does not go right across, but is stopped before it reaches the other side. This means that you cannot saw the sides of trench as before right down to the correct depth, except at the end that is open. The saw-cut forms a diagonal from the top of stop to the bottom of trench at edge. Having sawn as deep as you can, remove the waste down to the bottom of the saw-cut with a chisel. Then laying wood flat on bench, continue saw-cut, using a mallet and a chisel to cut the fibres of the wood. You will find that you can only cut a little way down at a time, then you must remove the waste before cutting again. Continue until the trench is the correct depth all the way along. This can be measured with a rule. A router is often used to finish off the bottom of a trench when it is too long to reach with a chisel.

The lap housing is marked out on the end, and in this case only one saw-cut is necessary, and that is across the grain. The wood is then held vertically in the vice and the waste removed with a chisel. This requires very little effort owing to the fact that you are cutting with the grain.

All these joints must have some form of fastening; they can

be glued and nailed, screws not being of much use in end grain unless the wood happens to be very hard. Nails are probably best for this purpose, and if they are driven in so that each pair of nails forms a dovetail, it will be quite strong enough for the purpose for which it is intended. After all, you make the joint for strength, and the simpler the joint the weaker it generally is. For their proper purpose, and applied in the correct way, the housing group is one of the most useful of joints.

Halving Joints.

The halving joint is generally used for building up framework of a simple character. It is, however, if well made, a most useful joint in the construction of simple articles of furniture made from strips of wood which are covered with ply. This is quite good

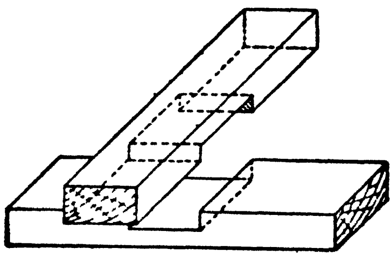
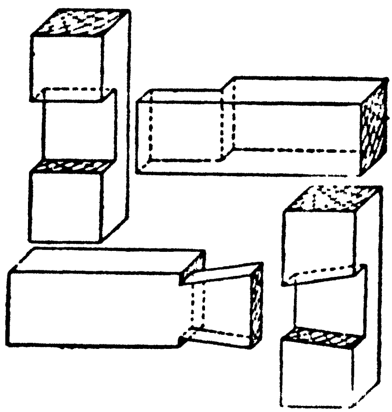


Fig. 11.—Cross-halving

practice where light articles are wanted. It is also used in building sheds, making fitments to fit in corners; in fact, it is a very useful joint and well worth mastering. The principle of the joint can be seen quite clearly from the illustrations. Fig. 11 shows the cross-halving used when the pieces continue past the joint. To ensure a tight fit it is always wise to place one piece on top of the other to check your measurements. If both pieces are the same thickness, then you remove half from each piece. If you always remember that what you take out of one you must leave in the other, you cannot go wrong. The general failure in making this joint is due to the lack of care rather than lack of skill; to be any good at all, the joint must be tight, so see that your lines are right and do not saw them out; always saw on the waste side, even if at the beginning it means using a chisel to make them fit. It is better to have a good tight joint than a sloppy one. Remove waste with a chisel, with the

wood held securely in the vice; on no account chisel it vertically if the wood is thin, as only disaster can follow. If you do chisel on the bench, keep the fingers of your left hand well away.

In the lap and dovetail halving (figs. 12, 13) you will notice that on one piece the waste can be removed entirely with a saw; the dovetail itself should be cut with a saw after removing waste. The slope of the dovetail is usually 1 in 6, but never less than 1 in 4, as this shortens the grain considerably. Use the dovetail as a template for marking the other half of the joint.



Figs. 12 and 13.—Lap and dovetail halving

Mortise and Tenon Joints.

A simple mortise and tenon is shown in fig. 14. This joint is much harder than the preceding ones, and great accuracy is required if the joint is to come up to all requirements; the mortise in particular requires great care in cutting.

The first process comprises marking out the position of the joint on the piece of wood in which you intend cutting out the mortise. Draw two lines, the width of the wood apart, right round the four faces; if correctly drawn they should meet on the last edge. As the tenon should be approximately one-third the thickness of the wood, you find out by measuring what this is, then select the chisel that is nearest to this dimension. You work this out first because the usual practice is to cut the mortise before making the tenon, and the mortise is always cut out the exact width of the chisel. Having selected the most suitable chisel, mark out the

mortise in the following way. You have already marked out the length when marking out the position of the joint, so all you need do now is to mark the width of the chisel down the middle. To do this, place the chisel on the line in the middle and press it into the wood. Set the gauge to the end of this chisel mark, then rotate the wood and try the gauge from the opposite side; this is a check on whether the cut was made in the exact middle. If it is not quite correct, adjust the gauge until it is so, then gauge between the two lines on the two sides through which the joint will pass. You should now have a rectangle drawn on both sides, the length of which is the width of joint and the breadth the thickness of joint, or, in this case, of the chisel. The idea behind marking out on both sides is to permit chiselling first on one side and then on the other.

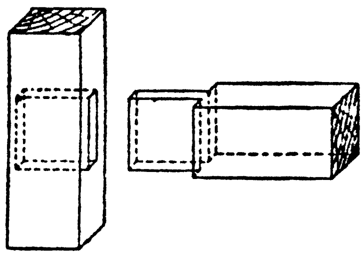


Fig. 14.—Mortise and tenon

To cut the mortise out, place the piece of wood either in a vice or firmly against the bench stop, then work as follows. Hold the chisel upright and about ¼″ from the end, remembering that it must also be at right angles to the grain in order to prevent splitting; then hit the chisel smartly with a mallet. The chisel will sink in quite an appreciable distance. Pull it out and move it along about ¼″, then turn it round; this time you cut *towards* the bottom of the first cut. The idea behind these two first cuts is to remove a wedge-shaped piece out of the waste in order to permit the easy cutting of the remainder of the joint. Move the chisel along the mortise about ¼″ at a time, hitting it each time smartly and squarely with the mallet, then prising towards the clearance, thus breaking away each piece in turn. To begin with, it is wise to remove each small bit of the waste as you cut it; this prevents the mortise becoming clogged and saves a great deal of trouble at the end. You will notice that as you work your way along the mortise the chisel will be going deeper and deeper until you get to the end of the mortise. Do not cut right up to the end line; leave ⅛″ still to be cleaned out. This protects the ends when prising bits out. Having worked your way all along, turn the wood over and do the same with the other side, cutting until the hole goes right through. Finally, clean up both

ends of the mortise, leaving them true and square. It is unnecessary to do anything to the sides. They may be a little rough, but as long as they follow the lines and are quite flat, that is all that matters.

You now take the tenon in hand. Mark it out on the extreme end, leaving it a little longer than required, so that the end can be planed flush after it has been glued. Square the length round the four sides, then cut with your knife; this marks the shoulders distinctly. Then hold it against the mortise with the faces flush and mark the thickness of the tenon from the mortise. Actually, the gauge will still be set from the mortise, but by doing it in this way you are making quite sure that the tenon will be right. Then gauge along the edges and across the end from both sides. It is usual to put crosses on the parts that are to be cut out, just to remind you which is waste and which is joint. To remove waste, use a tenon saw and hold the wood firmly in the vice. Make the first two cuts downwards with the grain, keeping the saw just on the waste wood side of the line but touching it all the way down to the shoulder line. Remove the wood from the vice, then cut across the grain, again taking great care to cut just on the waste side. Remember that the shoulders must be even if the joint is to bed down properly. Having cut out the tenon, it should be a tight push to fit it into the mortise, but it should not be necessary to use a hammer. If it is too tight, reduce the tenon slightly with a chisel, but always try to aim at a good fit straight from the saw, as this is the correct way and saves a great deal of fiddling about.

Bridle Joint.

The bridle joint, shown in fig. 15, is another useful version, and for some purposes it is stronger than the mortise and tenon, particularly if the pressure is acting downwards at right angles to the joint. The mortise in this case is the reverse and is cut out of the end where the tenon should be. It is marked out in exactly the same way as before, but in this case the saw can be used to cut down the two sides; then remove the waste with a mallet and chisel, this time working near to the shoulder line. If a wedge-

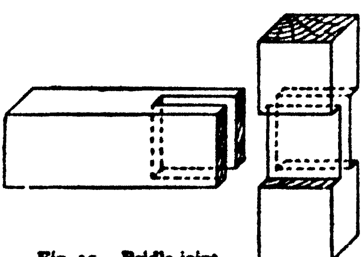


Fig. 15.—Bridle joint

shaped piece is removed first from one side and then from the other, the piece of waste will be broken out quite easily without having to work your way right along. The other part of the joint is marked out from the first piece, then sawn across the grain as in halving, and the waste removed in a similar way. Again there must be no strain when fitting or the wood will split along the grain.

Haunched Mortise and Tenon Joint.

Fig. 16 shows a haunched mortise and tenon. This joint is commonly used when joining two pieces of wood together right at the end. It is used in making doors of all kinds where a framework is required to carry panels. The mortise is marked out as in the previous joints but right at the end; it is then reduced in length by at least ½″, so that it does not come right out. Into this part the tenon only enters about ¼″. As a safeguard against splitting when chiselling the mortise out, it is usual to leave two or three inches of waste wood on the end, which is sawn off after the joint has been glued up. The tenon is sawn out the full width, then reduced to the size of the mortise, leaving a step to fit into the groove at end. The illustration should be studied carefully before attempting this joint, and the whole joint marked out before any cutting is done. You will then be able to see exactly what should be cut away and what should be left. Very often the mortise is cut only part of the way through and the tenon made shorter; this leaves the outside edge clean but is much more difficult to make, particularly if the mortise happens to be fairly narrow.

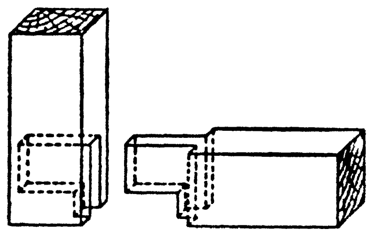


Fig. 16.—Haunched mortise and tenon

Dovetail Joints.

The three most useful forms of dovetails are illustrated below: fig. 17 is the simple dovetail; fig. 18 the common dovetail; fig. 19 the lap dovetail. The simple dovetail is used when the material is too narrow to permit more than one being cut, and is used on such things as trays or shallow drawers, rails fitting into wider pieces, &c. The wood must first be planed to the correct sizes and the end squared before the actual process of marking out the dovetail begins.

A line must be squared all round each piece the thickness of the wood away from the ends; this gives both the length of dovetail and of pins. In the simple dovetail joint, the tail is marked out first. The widest part of the dovetail should be at least half an inch less than the total width, otherwise the pins will be very weak, so mark this distance in the middle of one piece of wood. The slope is obtained in the following way. Draw a line down the centre of the wood and measure six times half the width of dovetail, or three times its total width from the end, and put a mark on the centre line. With the rule touching this mark and the end of the dovetail, draw a line, first on one side, then on the other. This gives the correct slope of 1 in 6. It is only necessary to do this once; after the dovetail is cut it can be used as a template for drawing round in order to form the others. To cut away waste, secure the wood in a vice, with the end uppermost, and saw carefully down the slope on the waste-wood side of the line; then, turning the wood at right angles, saw down the shoulders, first on one side, then on the other. Clean out any roughness with a chisel, taking care not to destroy the shape. Having made one dovetail, you place it on the end of the side piece and carefully mark round it, removing the waste in the same way. Now you can draw the remaining two dovetails from the two you have already made and cut them out as before.

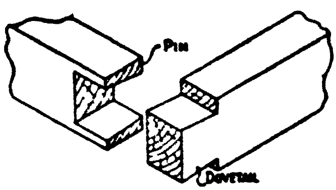
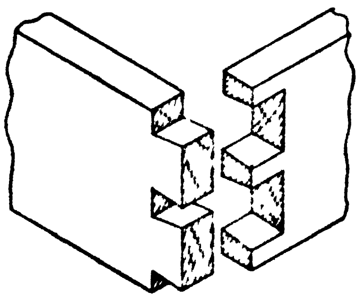
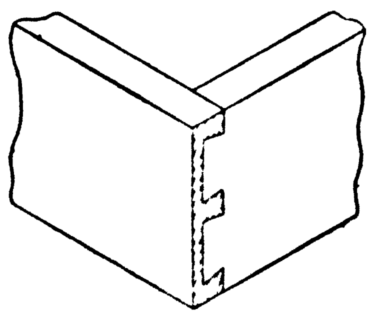


Fig. 17


Fig. 18


Fig. 19

To transfer the shape of the dovetail to the piece into which it

will fit, fix this piece securely in a vice, end up, and hold the dovetail squarely on top of it, flush with the ends and two sides, then with a sharp pencil draw the dovetail on the end. Remove the piece with dovetail on and square the lines you have just drawn down the sides to the line already there. To remove waste you must now saw just inside those lines to the correct depth, then remove waste with a chisel and, if necessary, assist it with a mallet. To be of any use a dovetail must be a good fit, but this does not mean that it has to be driven in with a hammer. That is fatal; before you know where you are the pins have broken right off. It should be just a tight push-in fit without any wobbling about. Make sure that everything is clean, no little bits sticking here and there; use only sharp tools and keep all corners sharp. Having done one, mark out the remainder, numbering each one as you fit it, and make quite sure before you start cutting that they are marked from the right side. It is amazing the number of times the first three are cut correctly and then the last is cut in the wrong direction.

The common dovetail follows the same principle as the simple type, but in this case the wood is wide enough to multiply the number of dovetails, thus making a much better and stronger job. In making the common dovetail the usual practice is to mark the pins out first; this is done by marking the dovetails on the end itself. To facilitate this process a template is made giving the correct angle, and is used like a square or bevel. A piece of tin or thin brass is required, 3″ × 1½″. This is marked into two squares 1½″ × 1½″, and on this line the metal is bent at right angles *after* the following operation. On one end measure ½″ from each corner, then join these marks by a line to the opposite corner on the same side. Cut away the two outside triangles thus formed, and you should have now a piece of metal 3″ long, ½″ wide at one end, and 1½″ wide at the other. Now bend it in the middle at right angles and you have a simple gauge which you can move along the edge of the wood, giving the correct slope for either side of dovetail. Having a gauge, all you need do now is to decide on the number of dovetails you intend to use, mark them out evenly on the end grain, then draw the correct slope, using the gauge you have just made. Fig. 18 gives quite a good idea as to size and position. Never make the pins so small that you cannot clean out the waste because you lack a chisel small enough. When you have marked out the pins, or dovetails, on the end grain, saw very carefully down

each side of the pin and remove waste with a mallet and chisel. When they are all clean and right, hold the pins securely on the end of the piece that will contain the tails, making sure that it is flush with the end and sides; draw carefully round each pin, then mark the parts that are waste with crosses. The waste is then removed from the dovetails with a saw and chisel. Greater care is needed than before, because the slightest amount wrong on one dovetail will throw all the others out. So go slowly, stop and consider often, and make sure you are on the right lines. If you do this you will not have much trouble.

The lap dovetail is a little more complicated. In this case the dovetails do not go right through but are stopped; a typical example of this is found on all well-made drawers. Examine one carefully and you will see how it is made. The first thing to decide is how much you will leave in or how long you will make the dovetails. They certainly should not leave less than $\frac{1}{8}$" of wood. Having decided this, you square a line round the end of the side pieces the length of dovetail. Then, using the gauge, you gauge a line on the end of the front piece, also the length of the dovetail. Mark out the dovetails on side piece, then cut away waste. Having prepared the sides, you transfer the dovetails to the front piece in the usual way. The difficult job of removing the waste round the pins has now to be undertaken. First of all saw across the diagonal of each pin, keeping on the waste side of line, then place flat on the bench and use a mallet and a chisel which is just the correct width. Start about $\frac{1}{16}$" from the end, hold the chisel vertical and strike smartly, breaking away the waste as you move along; this makes the recess square. You must now remove the waste on the slopes very carefully, using the saw marks to guide you. This can best be done with the wood held vertically in the vice and cutting downwards with the grain, using a narrow chisel to cut across fibres at the bottom. Make quite sure the corners are well cleaned out, but do not be tempted to undercut. The sides must be square and flat, even though they are on a slope. With care and patience it can be done; the result is very satisfying, and you feel very much a craftsman. Once again let me emphasize the necessity for really sharp tools. You cannot cut clean joints otherwise, and your work is very much harder and the results very poor. Good and accurate marking, then sharp tools and a little common sense, are the main ingredients for good joints, and, generally speaking, also for good craftsmanship.

THE USE OF GLUE

For a glue joint to last any length of time it must be well made and the surfaces must be perfectly flat. The glue itself must be properly made and of the right consistency, and finally, all gluing should be done in a warm room away from draughts. If these simple rules are adhered to, a glued joint will last almost indefinitely.

Glue can be bought in many forms: in tubes, as powder and in cakes. Tube glue is already made and needs little comment. The powder type generally has to be mixed with cold water, and f the mixing directions are carefully followed it will be found very successful. One point about cold-water glue is that you do not make stronger glue by mixing a greater proportion of powder to water; you must have the right proportions if your work is not to suffer. Another point not in its favour is that once it is mixed it must be used in a matter of hours, otherwise it is wasted. On no account should it be used after this period; it just will not do the job.

Scotch glue still remains the favourite among serious workers. It can be heated time after time; in fact, this seems to improve it. This type of glue is generally bought in cakes, and to be of a good quality it must be very brittle. Before melting it, the usual practice is to break it up into small pieces, leaving it in water overnight to soak. The best way to break it up is to wrap it in a piece of sacking or any old rag and hammer it. The idea behind the wrapping is to prevent the bits flying all over the place. Having broken it up, place it in water to soak—this can be done in the glue-pot itself. If you have not a proper glue-pot a tin will do. Remember that you do not put this directly on the gas ring, but inside a pan containing water. The heat must reach the glue through the water and not directly, otherwise the glue will simply burn itself up. During the process of boiling, stir the glue frequently with a stick. After all the lumps have melted, allow the boiling to continue until the glue runs off the stick in a steady stream free from all lumps. If the glue becomes very thick, use a little boiling water to thin it down; to thicken, just continue to boil, taking care always to keep water in the outer pan.

In the actual operation of gluing, better results are obtained if the parts to be glued are warmed slightly before application. If the room is warm that is generally quite sufficient, the idea being

to prevent the glue from chilling, which robs it completely of its gripping powers by preventing it from entering the pores of the wood. Apply the glue liberally to the surfaces to be joined, then squeeze out as much as you can by rubbing the pieces together or by the use of cramps. A word of warning regarding the use of cramps. Never force joints to meet if their faces are not correct; this merely crushes the wood, which tends to return to its former shape as soon as the cramps are removed, thus breaking the glued joint. Do not try to glue too many pieces of a job together at the same time; do it in stages. For example, be content to glue the framework of the job together; then, when the glue is hard, fit the other parts to it. Also, allow the glue plenty of time to set before working an article again; twenty-four hours is little enough time for this purpose.

NAILS

There is such great variety of shapes and sizes that it is impossible to tabulate them all here, but the principle underlying all of them is the same; they break through the natural fibres of the wood and are gripped by them. The head of the nail is so made that it adds to the holding quality. The choice of type of nail depends on the nature of the work it is expected to do, the thickness of the material and its hardness. Greater care is needed when choosing nails for thin wood than for thick. From the principle of the nail it is fatal to drive nails too near to the end of the wood because of the danger of splitting. If you must have nails near the end always drill a hole to receive them, just slightly smaller than the diameter of the nail. Nails driven into end grain have little hold unless they are set at an angle; all nailing should follow this principle. They should form dovetails in pairs, each nail being driven in at an angle towards or away from the other. A bradawl is a useful tool, provided that it is the correct size; if it makes a hole larger in diameter than the nail itself it is useless. Always drive your nails well away from edges and ends; these are the danger spots you should avoid. Try to nail thin wood to thick. If you must make a very light box, always make the end pieces thick enough to receive nails. Finally, a well-nailed job can be quite satisfactory; the nails can often be hidden by punching below the surface and filling recesses, thus giving quite a clean appearance. You must use nails sometimes, so do it intelligently.

SCREWS

Screws, like nails, vary much in size, but you can always obtain the right size for the right job. They differ from nails in that they have a threaded portion which tends to draw the screw into the wood and at the same time prevents it from pulling out. All screws have three distinct parts: the head, which has a slot to receive screw-driver, a short length of plain diameter, then the threaded portion. In fitting screws, holes must be drilled to suit each of these parts. Let us examine the operation more closely. Two pieces of wood have to be joined together by screws; this is invariably a butt joint, where one piece of wood is screwed to the other. You first of all decide on the position the screws will occupy, then drill holes to suit the plain portion of screw. Next, the outside end of the hole is countersunk to receive the screw head. The two pieces of wood are then held in position and the holes continued with a smaller drill, one that is suitable to receive the threaded portion of screw. This means that when the screw is driven home only the threaded portion will have to force its way into the wood. When screwing into very hard wood it is always advisable to rub soap or wax on the screw; this facilitates its entry and makes it possible to withdraw the screw at a later date without damaging the head. It is possible to screw soft wood together by just using the smaller bit, but for hard wood it is essential to drill holes to suit each portion of screw, particularly if the screws are made of brass.

HOW TO FINISH THE WORK

There are various ways in which you can finish the articles described in this section, depending primarily on the purpose for which they are intended. You will have noticed that articles of furniture are generally stained and polished. If they are made in a good quality material, such as oak or mahogany, they are french polished directly on the wood itself without any previous treatment, or after the wood has been darkened to give it a richer appearance. The suggestions following allow a sufficient variety to choose from, any of which will give complete satisfaction if well done.

Staining.

The most popular stain consists of vandyke crystals dissolved in warm water; the colour can be made to vary from very light brown to almost black, according to the quantity of water used. Water stain, however, has one great drawback: it always raises the grain, making the surface quite rough and requiring a great deal of careful glass-papering to restore it to its original smoothness. Oil or turpentine stain is also very popular, the chief advantage being that it does not raise the grain, so saving time and energy. A suitable stain can be made from Brunswick Black and turpentine, the required shade being obtained by the ratio of the mixture. This stain is almost permanent and the colour is very rich.

Stain is applied in a very simple way. A piece of rough material such as sacking is used to rub the stain into the wood by working always across the grain, then wiping away any surplus pockets that remain. The stain must be allowed at least a whole day to dry thoroughly before proceeding further. When it is absolutely dry it should be glass-papered all over, using the smoothest glass-paper obtainable; to make doubly sure of not scratching the work, rub two sheets of glass-paper together to destroy the cutting edges. Care should be taken, particularly along the edges, not to rub right through the stain. This should be followed by dusting in order to remove all grit, especially in the crevices.

As a great deal of plywood is used nowadays a word of warning can be inserted here. If you can, always use an oil stain. You will find that water stain invariably gives a different tone to plywood panels than to the surrounding framework, and by the nature of the wood composing plywood a great deal of time will be spent glass-papering smooth after staining.

Varnishing.

There are three types of varnish: oil, spirit and brushing polish. Oil varnish is rather slow-drying, and if the surface is to be used then time must be allowed for this purpose. Because of this also, the room in which the drying takes place must be warm and free from dust if you wish the finished surface to look really good. Spirit varnish dries more quickly, but it is not as elastic, nor are the results quite as good as those obtained by oil varnish. Brushing polish is a mixture of varnish and French polish, about the same quantities

of each; if it feels a little sticky when working, it should be thinned with a little more french polish. Always use a fairly soft brush, working it as little as possible, and on no account going over an area that has just been done. Always work in a warm and dry room; this prevents the polish from chilling and casting a white bloom over the polish, which, as a rule, can only be removed by stripping all the polish right off. Between each coat the work must always be lightly rubbed with No. o glass-paper and then well dusted.

A very nice finish can be obtained with wax polish after the surface has had at least two coats of brushing polish. This is carefully rubbed down with glass-paper to remove all the shine, then a thin coating of wax polish applied, and when dry vigorously rubbed with a suitable piece of polishing cloth. This produces what is generally called an egg-shell gloss. Further applications of wax and plenty of rubbing will improve the surface considerably. The beauty of this finish lies in the fact that finger-marks, &c., can be very easily removed simply by a little rubbing.

Painting

This has become a very popular finish, particularly for whitewood articles of furniture which do not take readily to staining; as a rule such material is not of a very high quality, a fact which staining seems to accentuate. Before painting, all the holes and discrepancies should be filled with a hard stopping or plastic wood, then very thoroughly glass-papered and dusted. The paint itself must be well mixed by stirring, then a small quantity is poured into a suitable vessel through a piece of muslin; this is used to trap any foreign bodies and the skin which forms on the top of the paint. Only the tip of the brush should be dipped into the paint; then the brush should be tapped against the side of the paint tin in order to distribute the paint evenly between the bristles. In theory the paint forms a thin skin over the wood and the brush is used for the purpose of spreading it evenly. This is done by brushing first in one direction, then across at right angles, finally finishing by working in the same direction as at first. Brushing at first should be fairly heavy, in order that the paint will be evenly distributed and as thin as possible; the last strokes, however, must be very light indeed in order to prevent brush marks showing when the paint has dried. It is fatal to apply a thick coat of paint in the belief that it will save a second coat; the thinner the coat the better, and by thinner we

mean by brushing and not by reducing the consistency of the paint itself. Take care not to leave streaks near the edges of work; they look bad, and being so much thicker, take a very much longer time to dry.

When the paint has dried thoroughly, the surfaces are lightly glass-papered and dusted before the second undercoat is applied; this in turn should be rubbed down before putting on the final coat. With all new wood, three coats are essential, and four better still. The first is a priming coat, followed by two undercoats of the final colour.

Enamel.

This is used only as a final coat. The work is painted as before, with the last undercoat made specially to suit the enamel to be used. Enamel must be applied liberally with a full brush, working over the surfaces as little as possible in order to avoid brush marks. Enamel should really flow evenly over the whole surface with very little help from the brush. Never use a dry brush; it must always be wet. On the other hand, you do not want it so thick that it runs down the sides like waves on the sea shore! Try to apply just the right amount of enamel with each stroke of the brush.

Brushing Cellulose.

This medium has several advantages over ordinary oil paint which make it very popular. When dry the surface is exceptionally hard, and when dirty can be scrubbed with soap and water without fear. It can later be painted again without having to strip the old lacquer off, unless it happens to be peeling very badly. It cannot, however, be used on top of new oil paint; this causes it to crinkle and crack in all directions. And it must not be used near a naked light. Otherwise it is exceptionally good and lends itself well to the efforts of the learner. When applying, it must be done quickly and evenly with a soft brush, and on no account worked out like oil paint. The lacquer should flow from brush to surface, and as the area is covered it should blend together, thus destroying any brush marks there might be. It is very bad practice to draw the brush across any section that has started to dry out. On new wood it is necessary to apply an undercoating of special cellulose filler in order to close the pores in the wood. If this is omitted the surface becomes patchy, owing to the fact that some areas are more porous

than others. The covering power of cellulose is remarkable; one coat is generally sufficient to do the job. A rather pleasant dull effect is obtained by using a cloth dipped in soapy water, then sprinkling with pumice powder and rubbing the cellulose all over. This takes away the high gloss but leaves a surface like glass. Another appealing quality is that it will dry quite hard in a matter of hours.

Some Useful Articles to Make

A BENCH HOOK (fig. 20)

Material required:

1 piece 10″ × 6″ × 1″ hardwood.
1 piece 12″ × 1½″ × 1″ hardwood.

Operations.

1. Plane up the larger piece to the size given, 6″ wide, 1″ thick, then square the ends, using try-square and tenon saw.
2. Plane the second piece to 1½″ × 1″. Then mark out with rule and try-square two pieces 5½″ long. Saw off the waste at either end and cut out the waste piece in middle.
3. Bore two holes in each piece, at least 1″ from the ends, $\frac{3}{16}$″ or ¼″ diameter, and countersink the top side to take screw heads.
4. Glue both blocks into position as shown in drawing, and allow time for glue to set.
5. Using a ⅛″ drill, continue hole through wood until it is 1¾″ deep, then screw both blocks in place with two 1¾″ × No. 10 wood screws.

The sawing block is now ready to use. Place it on bench so that the underside block is resting against the front edge of bench or table, to prevent it from moving. By holding the piece of wood being sawn firmly against the top block with the left hand and using the end of the block to guide the saw, a good square cut can be made very easily.

This is really an essential part of any woodworker's equipment, and should be made first, because later it will be used almost every time you use your tenon saw. A further help in holding the board

is to fasten the bottom block firmly in a vice. It will be noticed that either side can be used.

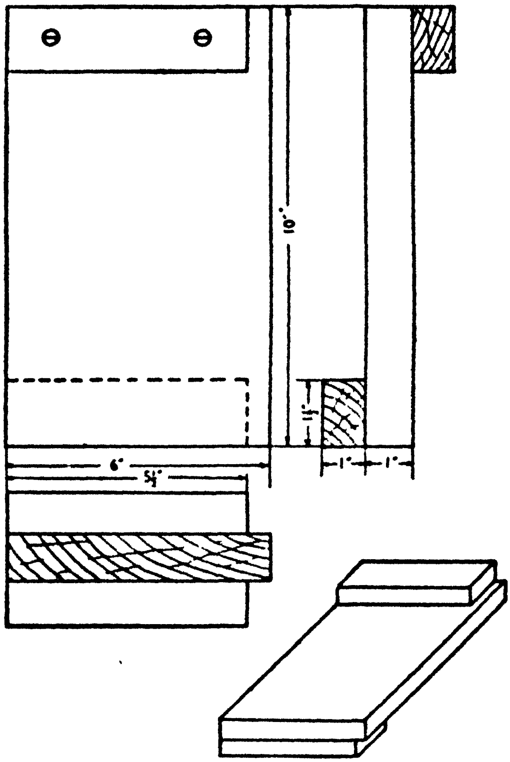


Fig. 20

A LETTER RACK (fig. 21)

Material required:

1 piece 16½" × 5" × ½" or ⅜" back.
1 piece 16" × 5" × ⅜" front piece.
1 piece 16" × 1" × 1" distance piece.

Operations.

1. Saw your pieces of wood to a little more than the finished sizes, allowing at least ½" on length because of the difficulty of sawing less than ½" at the ends.

Plane face, side and edge of piece for back, gauge 5" wide and plane to line; then gauge ½" or ⅜" thick and plane off waste. Using try-square, square or line ½" from one end, measure the required length of back from this line (16") and again square line across. Knife these lines, then saw off the waste at either end.

2. Plane up second piece to 16" × 5" × ⅜" and on this mark out the three pieces forming fronts of racks. To do this, start from the right end and square a line ½" from the end, then mark 5" from this line and square across. Leave ½" waste, then proceed in the same way to mark out the other two pieces. You should have ½" waste, 5", ½" waste, 5", ½" waste, 5", waste. All lines should now be carefully cut with knife and try-square, then the waste sawn out, leaving you with three pieces 5" × 5". The grain of front pieces should follow the grain of back for strength. If they are screwed on with the grain running across, they will split with the grain if dropped or if too many letters are jammed behind. To mark curves on the two top corners use a penny to draw round, making quite sure that the grain is running the correct way in each case. When they are all marked, chisel the waste away very carefully until the corner is quite round, then finish off with a file, working in the direction of the grain.

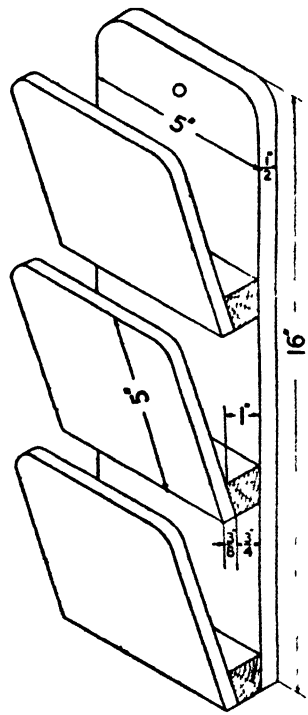


Fig. 21

3. The third piece is now planed to the required size, 1" × 1". Set gauge to ½" and draw a line with it parallel to one edge. The wood is now planed to the angle marked by the gauge line and the opposite edge. This operation is best performed if the wood is held securely in the vice. When the angle has been planed the three pieces forming the bottom of racks are set out, allowing sufficient waste between each to permit sawing. The ends should be chiselled smooth and glass-papered.

4. The rack is now ready to assemble; mark out on the back

exactly where each shelf will fit, starting at the bottom. Lines should be squared across as follows: 1", 4", 1", 4", 1". The position of the hole to be used for hanging the rack up should be marked at the same time; then a suitable hole bored for this purpose—¼" diameter will be quite sufficient. As each shelf is to be held by two screws driven in from back, bore two holes between each of the 1" spaces, at least 1" from the outside edges and $\frac{3}{16}$" diameter, to receive screws. These holes should be countersunk to receive screw heads. The blocks should now be glued to back and then the fronts glued into position. The screws are driven in when the glue has set; this prevents the pieces moving about during the process of screwing. The screws should be long enough to almost penetrate the front pieces but not quite; this adds greatly to the strength of the rack. The work now requires glass-papering all over with fine glass-paper, paying particular attention to all edges; there should be no sharp edges when finished. Finish with either paint or french polish.

A SIMPLE BOOKSHELF (fig. 22)

Material required:

3′ 0″ × 4″ × ⅜″ sides and shelf.
3½″ × ⅜″ × 20 S.W.G. strip of brass for hangers.

Operations.

1. The sides and shelf are planed up in one piece; if this proves a little unwieldy, cut the shelf off and plane separately. The beauty of this very simple shelf lies in perfect workmanship, so be as accurate as you can in all your measurements. The pieces are planed to finish 4″ × ⅜″. Square the ends carefully and remove waste. The shelf should be 17″ long when finished.

2. The two side pieces are planed up as one, then marked out as shown in sketch. Leaving ½″ of waste on each end, mark out the two pieces each 7″ long. The trenches are then set out 4″ from the two outside lines; notice that you have a left and a right side, and the exact thickness of the shelf. Remove waste from trenches with saw and chisel in the usual way, holding the wood flat in the vice.

3. Saw the waste off each end, then cut the waste out of middle. With a pair of compasses or with a disc such as the lid of a jar,

mark out the curves at the four front corners. Then, using tenon saw, cut away as much of the waste as you can, next chisel away the remainder, finishing with a file and glass-paper.

4. The three pieces can now be thoroughly glass-papered, removing all sharp edges in the process. Glue shelf into position,

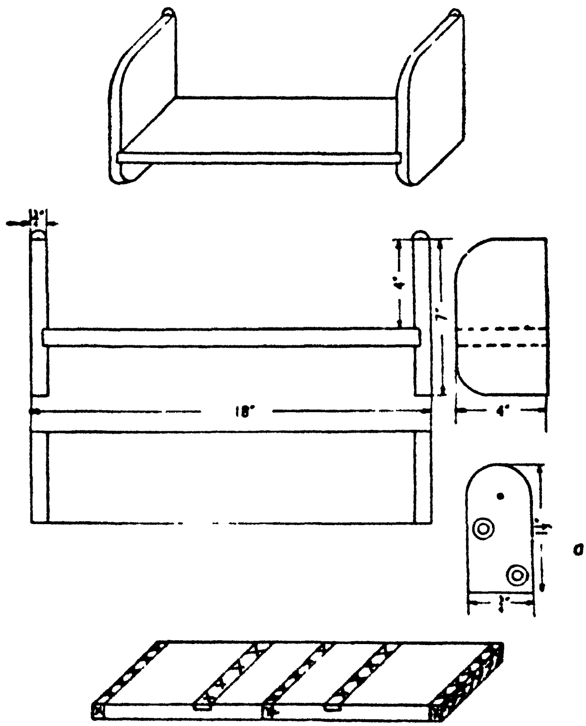


Fig. 22

and if you have a pair of cramps use them to keep the ends in place until the glue is hard.

5. While the glue is setting, cut out the two brass pieces as shown in fig. 22*a*, filing the top edge nice and round and removing all the sharp edges with either a file or emery paper. Drill two holes as shown to take screws; these should be large enough for ¾" No. 6 screws; countersink them to receive heads. The smaller

hole need only be $\frac{1}{16}''$ diameter, so long as it will take a $1''$ or $1\frac{1}{4}''$ thin nail such as a panel pin. Screw the plates on to the back of both sides with the small hole just above the sides in order that you may hammer the nail into the wall.

6. Now give the whole job a final glass-papering; then, if it is oak, either french polish it or wax it, whichever you prefer. A beautiful surface can be obtained by giving it two coats of french polish, next rubbing it well down with very fine glass-paper until all the shine has gone, then finishing off with wax polish. This requires a great deal of energy, but the result will amply reward you and will look very much better than if it were french polished entirely. Oak may be darkened by stain first before polishing, if you wish to have it more like old furniture.

7. To hang up, place it in position (just over the bed is a popular one), then drive two thin nails through the small holes at an angle of 45° downwards, taking care to hit the nails squarely so as not to damage the plaster. It is as well to measure the distance from the floor at both ends of the shelf in order to get it level before nailing. This may sound a very insecure method of holding shelf to wall, but one that I nailed up over four years ago is still secure and carrying its full quota of books. The secret seems to be in the angle at which the nails are driven in. In old plaster, one should use Rawlplugs.

BATTLESHIP (fig. 23)

The drawing should be carefully measured for all dimensions, and redrawn several times larger; be careful to preserve the same proportions. From this enlargement you will be able to make a ship of any required size, or to suit whatever wood you have available.

Make the hull first. To do this, decide on the size you wish the model to be, and plane a piece of wood accordingly. Draw a line down the centre, then, using a pair of compasses set at a suitable radius, draw in the curves at both ends. The waste is then pared away, finishing off with glass-paper. The hull is now reduced in thickness for two-fifths of its length. Mark this shape on sides; then, holding it in vice, saw down with the grain on the waste side of line; having gone to the correct length, saw at right angles to the grain, removing the waste. File this part smooth.

Now cut out of suitable wood the following pieces, all made to correct proportions: (1) Fore shelter deck. (2) Bridge and central tower. (3) Funnel. (4) Torpedo tubes. (5) Gun turrets. Make each piece separately, finishing them off as neatly as you can with glass-paper. Pins or thin nails are used for the actual guns, and these should now be inserted. The funnel should be made from a

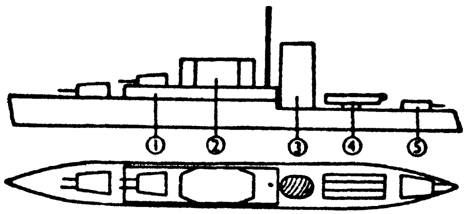


Fig. 23

short length of dowel rod filed flat on two sides, then made smooth with glass-paper. Glue the deck (1) on first, then glue all the other pieces into their proper positions. Having made the ship, give it a coat of naval grey paint.

A base should now be made to hold it. A piece of wood slightly greater in length and width is required and about ½" thick. Waves can be moulded on this with putty and, when hard, suitably painted.

WALL BRACKET (fig. 24)

Material required:

1 piece 8" × 4" × ½" back.
1 piece 4½" × 3" × ½" shelf.
1 piece 3½" × 1" × ½" bracket.

Operations.

This bracket is designed to carry a small vase to hold flowers, &c., a very popular feature in modern homes. It requires very little material and the minimum number of tools.

1. The back is made first. This should be planed to the size given. Mark out the housing for shelf and remove waste in the usual way. The shape of back is now drawn, using a pair of compasses. The two 4" curves should meet in the middle at the top, the

radius at two bottom corners being 1″. A halfpenny is useful for drawing round and is just 1″ in diameter. Carefully remove waste with a chisel, then finish off with a file and glass-paper, working with the grain round each curved surface.

2. The shelf is now set out as shown; this is part of a circle with a radius of 2½″, the centre being $\frac{5}{16}$″ from the edge. Chisel away waste and smooth with glass-paper, always following the grain

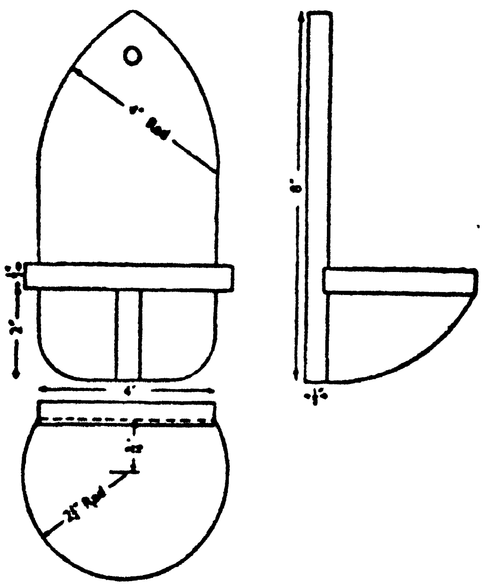


Fig. 24

of the wood. The shelf is then fitted into its housing and held in place with two suitable screws.

3. Make the bracket piece in a similar way. This is glued and screwed both to back and to shelf, the screws being inserted through suitable holes bored in the shelf and back. A small hole about 1″ from the top and in the middle of the back is now bored for hanging purposes.

4. The bracket should then be polished or enamelled in a suitable colour to match the general decoration of room or colour of woodwork.

TRAIN (figs. 25, 26)

Material required:

30″ × 2¼″ × ½″ to make bottom of engine and trucks. A piece 3½″ × 1¾″ × 1¾″ to make engine boiler, and a few odd pieces of 3/16″ three-ply wood and various other bits as described in text.

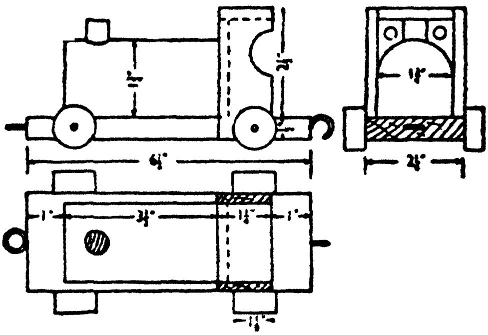


Fig. 25

Operations.

1. Saw a suitable piece of wood 30″ long and plane it to 2¼″ × ½″. This will make the base of engine and allow enough to make four

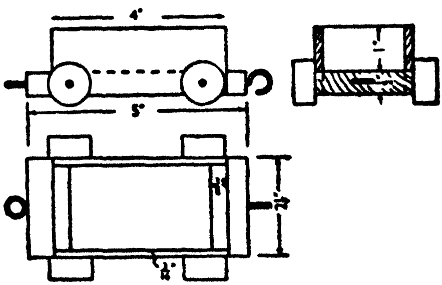


Fig. 26

trucks. Square a line all the way round one end, leaving ¼″ for waste; then mark the following measurements and square them across the wide side: 6½″, ¼″, 5″, ¼″, 5″, ¼″, 5″, ¼″, 5″, the ¼″ being waste between the pieces required and marked accordingly. Before

sawing the pieces, set out the recesses in the side of each truck bottom, 4" × $\frac{3}{16}$"; by doing it in this way the gauge can be set and lines drawn on each piece in one operation. Do this on both sides and square lines across each side and edge. The two recesses can also be marked out on engine base 1¼" × $\frac{3}{16}$", 1" from the end. To remove waste, make two saw-cuts, one at each end of recess, down to the $\frac{3}{16}$" line, then carefully chisel out waste. Having done this satisfactorily, the waste may be sawn away between the pieces.

2. The cab of engine is now taken in hand. Cut a piece of plywood 3" × 2⅝" and draw a line down the centre, making two oblongs 3" × 1$\frac{5}{16}$". On this line bore a 1" diameter hole 1" from the end, then saw the piece in two; fit into recesses on side of engine and nail in place. A piece of ⅜" wood is now required to make the front of cab and roof. This should be planed the width required, then a piece sawn off 3⅛" long, and another 1¼". Two ¼" holes are bored in the 3⅛" piece as shown in end view and both pieces are then nailed to sides of cab, using ⅝" panel pins. The boiler is now sawn and planed to 3½" × 1¾" × 1¾"; make quite sure it fits squarely against the cab. The centre of each end is found by drawing lines across the diagonals, then a semicircle is drawn on each end ⅞" radius. Holding block in vice, plane away the waste until the top of boiler is quite round, finishing off with glass-paper. Bore a hole ½" diameter about ⅞" from the front end of boiler to receive a short length of ½" dowelling to form the funnel. Nail the boiler in place from underneath, then glue funnel into the hole previously made.

3. This completes the engine for the time being. Now we start to build up the trucks. Saw a strip of $\frac{3}{16}$" three-ply wood 1½" wide, then from this saw eight pieces 4" long. These pieces are fitted and nailed into the recesses on the truck bottoms. Now plane another strip of wood 1" × ⅜" and cut it into pieces just long enough to fit in between the plywood sides; you will want eight of these. Nail each piece into place through the plywood sides.

4. Wheels are now made from a suitable brush handle, and holes bored in the centre of each, big enough to take a 2" large-headed nail easily. Mark the position of the wheels on engine and trucks and make a suitable hole to receive nail with a bradawl slightly smaller in diameter than the nails themselves. The wheels can now be nailed on, leaving them quite free to revolve. Hooks and eyes are then screwed into the engines and trucks to join them together.

5. The engine and trucks should be painted in very bright colours. Small cubes can be made to fit into the trucks to form freight, and will add to the fun. These should be painted in different colours, so that various combinations can be made.

MODEL OF "HURRICANE" (fig. 27)

Material required:

1 piece 5½″ × 1⅛″ × ¾″ fuselage.
1 piece 7¾″ × 2″ × ¼″ main wing.
1 piece 2⅛″ × 1⅛″ × 3/16″ ply for tail.
Pieces of ply for fin, rudder, wheels.

Operations.

1. The drawings are half-size and should be redrawn to twice scale. After planing up the block for fuselage to the right size, 5½″ × 1⅛″ × ¾″, draw the side elevation of plane with the aid of a piece of tracing paper on the wide side. Mark out the position of main plane as shown by "A", and tail plane by "B". Square these lines across block, then gauge the correct depth on both sides. The trench "A" is 2″ wide by ¼″ deep, "B" is ⅞″ × 3/16″. You will notice that the gauge will have to be set at more than 3/16″ because of height of cockpit above tail plane before the block is cut to shape. Remove the waste from trenches A and B, then chisel fuselage to shape. When the side view is correct, trace the top elevation of fuselage and draw it on the block. Chisel to shape as before. Owing to the shape of block it is now difficult to hold in vice; do so if you can, leaving both hands free to manipulate the chisel. Both sides will now be chiselled to shape yet square; the next operation is to make it as the section "C" depicts, rounded on all corners; again this is done with a chisel, working the various shapes one into the other. The fuselage is then filed and glass-papered until perfectly smooth.

2. The wing is then planed to size and fitted in groove A. After marking the position of fuselage on wing, draw the shape of the wing out, then carefully chisel away all waste. A fret or coping saw is a useful tool for this purpose. When the shape has been obtained, pare away the trailing edge with a chisel to section "D", then file and glass-paper until the section flows smoothly from the fuselage to wing tip.

3. Cut tail plane out of plywood, again using a fret or coping saw to facilitate this. Being plywood it is rather difficult to chisel to shape, so I suggest that you shape it by filing and glass-papering. The fin and rudder are made in the same way in one piece, then glued and nailed with panel pins to tail plane.

4. The pointed nose piece is then sawn off in order to fit propeller, and the main wing and tail glued into position. The main wing can be screwed to fuselage and the tail nailed as well as glued.

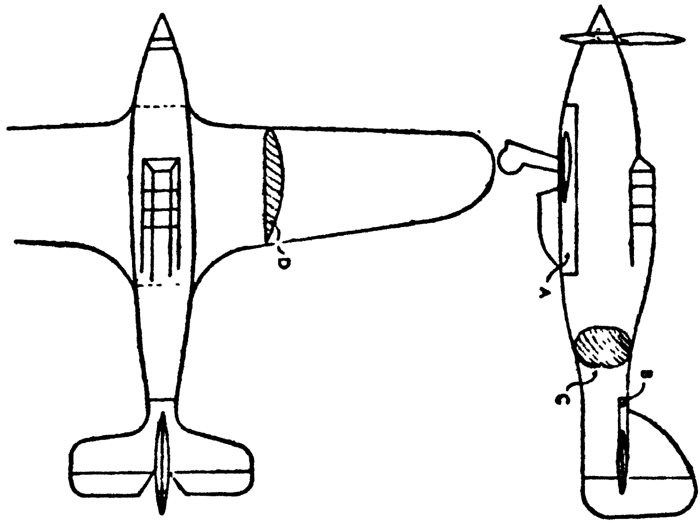


Fig. 27

The radiator is then made and glued underneath. The wheels and spats and struts are cut out in one piece as shown in side view, allowing a little extra in the length to fit in a mortise made for them in wings. The propeller is cut out of thin tin, then bent to shape and fastened into position by a pin that passes through the pointed piece just sawn off. The whole plane should now be glass-papered with fine glass-paper, then painted like the real thing.

5. A simple stand to hold the model can be made out of a circular piece of wood, say 3" diameter by ½" thick, and a piece of fairly stout wire bent in a suitable way with one end driven firmly into base and the other into fuselage. An effective way of showing planes off to their best advantage is to suspend them from the ceiling with black or white cotton, whichever shows the least against the walls.

KNIFE BOX (fig. 28)

Material required:

2 pieces 15" × 3" × ½" sides.
2 pieces 8" × 3" × ½" ends.
1 piece 7¼" × 3" × ½" partition.
1 piece 10¾" × 3" × ½" partition.
1 piece 16" × 9" × ¼" plywood.
2 pieces of brush handle 4" long.

Operations.

1. The first thing you have to decide before commencing work is the type of joint you intend using in the construction of the box. Three methods are shown: fig. 28*a* is simply nailed, fig. 28*b* half-lapped, fig. 28*c* is lap-housed. The half-lap shown in fig. 28*b* is by far the strongest, and is fairly simple both in marking out and making. It is necessary to know the type of joint to be used before the ends can be cut to their correct length. In the simple butt joint, the end pieces are cut to the exact size of inside box measurement. The sides are cut the correct length of box, then nailed to the ends. If the lap-housing joint is used, then the ends must be cut to suit, and are 7¼" long; this permits the recess on sides to be cut ⅛" deep, the minimum depth. For the half-lap joint both the sides and ends are cut to the full sizes as shown, 15" and 8" respectively. The butt joint is so obvious that it needs no explanation regarding its construction. In nailing, however, all nails should be driven in at an angle in pairs, in the form of a dovetail; this greatly strengthens the joint.

2. The construction is as follows for the other two joints. Plane up face, side and edges of the two side pieces. Gauge and plane width, then thickness. Mark out length with rule and try-square, then saw off waste. The finished pieces should be 15" × 3" × ½".

3. The end pieces are now treated in the same way, only this time the length will be made to suit the type of joint you intend making, whether housing or half-lap. If housing, they will be 7¼"; if half-lap, 8".

4. The four pieces forming the box are now ready, and the chosen joint marked out on the ends. The lap-housing will be described first. Place the two long sides conveniently on the bench,

then set your gauge to half an inch. Gauge lines parallel to each end on the inside only; this gives the thickness of the end pieces. To mark depth of housing, set gauge to ⅛", and gauging from the side on which the ½" line is drawn, draw a line on the ends and a short way along the edge on either side. To remove waste, place side on

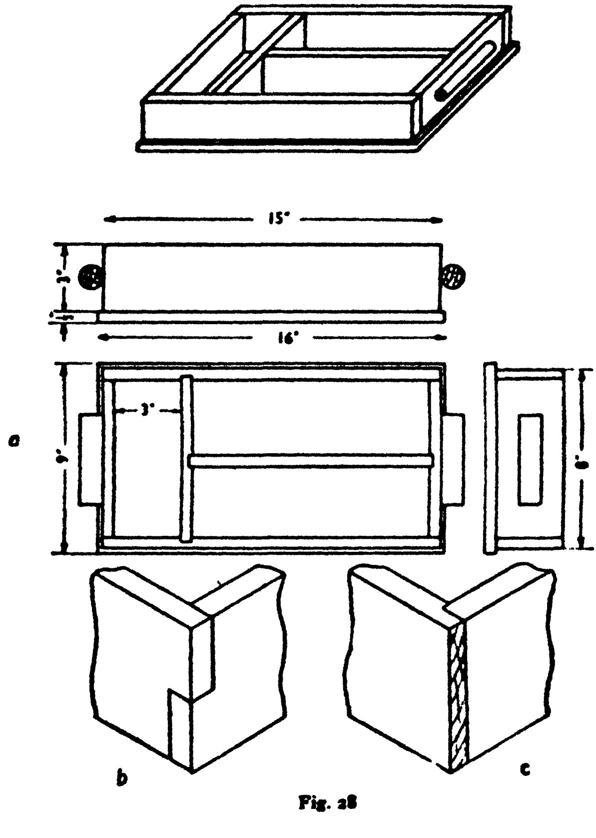


Fig. 28

sawing board or bench hook, then saw on the waste wood side of line down to the ⅛" mark. The side is now placed in the vice vertically, and a chisel is used to cut away waste to line. All four joints are made in the same way. If the chisel is held with the cutting edge in the gauge line and a mallet used to tap it squarely and smartly, there is very little danger of the wood splitting in the wrong place; by using the mallet you have greater control over the chisel.

In the half-lap joint, all the joints are the same, so the marking out is greatly simplified. Arrange the four pieces of wood forming the box conveniently on the bench, then set your gauge to the thickness of the wood; this should be ½″ unless you are using wood of a different thickness. A line is now gauged all the way round each end in turn. This means that an oblong has been marked on both ends of each piece 3″ × ½″. Now set the gauge to half the width, and check very carefully by trying it from both sides; it should be 1½″. Gauge a line across each end and a short way down both sides, cutting the 3″ × ½″ rectangle into two equal parts. The joint is formed by removing one of these halves from each end with a tenon saw, taking care to remove the pieces on the same side. When removing waste with saw, grip wood in vice and saw across the grain first, then with the wood held vertical, either saw or chisel down the 1½″ line. Having cut all the joints, fit them together, so making quite sure you have cut them all on the right side. Number them carefully for refitting, then mark out roughly the position of the pieces forming the sections; this need be little more than a cross, it is just a safeguard to prevent you from marking the trenches in the wrong places. Having done this, separate the pieces and proceed as follows. On the two long sides, mark out on the sides bearing the crosses a groove ½″ wide and 3½″ from the end, gauge for depth ⅛″, then saw and remove waste in groove with a suitable chisel. Remember, you must always saw across the grain on both sides of groove, just inside the waste-wood side of line and to the correct depth. The waste can then be easily removed with a chisel if the side is held securely in the vice. A similar groove is now cut out of the middle of one end.

5. The box is now nailed together, using 1½″ panel pins or fairly thin nails; two should be driven through each part of lap. Before nailing, make quite sure the end piece with the groove in it is at the right end, because once nailed it is almost impossible to separate joints without doing damage to the structure. If you have to make such a separation, you will be amazed at the strength of this joint.

6. The two pieces forming the partitions are now planed to size and cut to correct length; this should be obtained from the box itself. The piece parallel to the end must now have a groove cut in it opposite to the groove in the end and of the same size. This piece is pushed into position in order to obtain the correct length of the dividing piece. After fitting, do not nail until the handles are

screwed into place. These are cut from a brush handle and are 4" long. File the ends carefully to make them smooth and remove all sharp edges. Mark the position where the handles will be screwed on the ends, then bore two holes about 2" apart in each end to receive the screws. The divisions are now removed, and the handles screwed into place with two 1" No. 8 screws from the inside. Replace divisions, then securely nail them. When nailing the longer piece through the end you will have to pack the 3" space with wood in order to make it solid while the nails are being driven in. You might be able to place the box over the corner of a table in such a way that no strain is placed on the cross piece. Failure to do this may result in the cross piece breaking.

7. The bottom is now prepared by planing it to the correct size. The bottom can be made from similar wood or from a piece of plywood. When it has been planed, mark out the position the box will occupy, bore suitable holes to receive screws, then carefully glass-paper all over, removing all sharp edges in the process. The bottom is now screwed to sides. It could have been nailed, but screwing is by far the better way to hold it in position.

8. The box is now ready to finish. Glass-paper it thoroughly all over, paying particular attention to all sharp edges; they must all be rounded nicely in order to prevent damage to the hands when in use. Painting either with oil paint, enamel or lacquer is the most satisfactory finish unless it is to be kept in a drawer, then it can be varnished and the inside lined with baize that is cut to shape and glued into position. Whatever finish you decide to use, remember it must be such that a wipe with a damp cloth should be sufficient to clean it.

BOOKCASE (fig. 29)

Material required:

2 pieces 2′ 10″ × 7″ × ¾″ sides.
4 pieces 1′ 5″ × 7″ × ¾″ shelves.
1 piece 1′ 7½″ × 2″ × ¾″ plinth.
2 pieces 8½″ × 2″ × ¾″ plinth.
1 piece of ply 2′ 10″ × 1′ 6″ back.

Operations.

1. Plane up the two side pieces to the correct width and thickness, then saw to exact length, planing ends on shooting board if possible.

2. The four pieces forming shelves are now planed and cut to length. Make quite sure that they are all exactly the same length, otherwise your sides will not be parallel.

3. Decide which of the faces on the side pieces you are going to have on the outside, then mark the position of each shelf on the

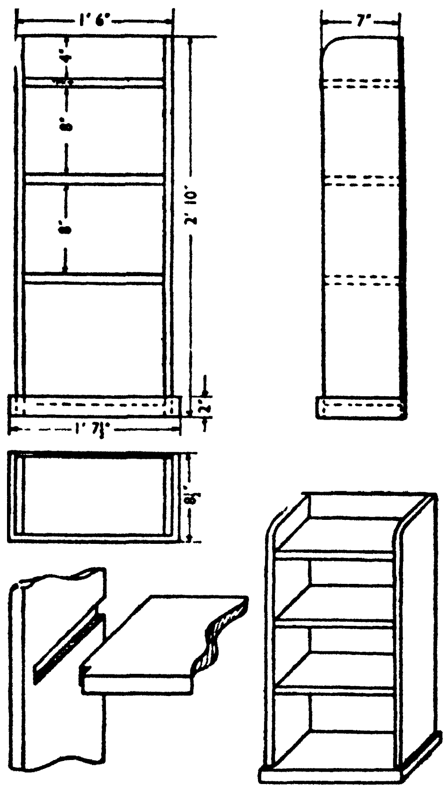


Fig. 29

two inside faces, taking care to match them correctly. Remember that one will be left and the other right. Having marked the position of the shelves by two lines, the distance between which must be exactly the same as the thickness of the shelves, gauge a line ½″ from the front edge of side pieces. The groove does not go right across but is stopped at this distance from the front edge. This

stopped housing gives the front a much neater appearance than it would otherwise have if the grooves went right across. The depth of groove is now marked on the back edge with the gauge set at ¼".

4. To cut the grooves out successfully requires a fair amount of skill. By working carefully and slowly, however, and following these instructions, a fairly good job will be made. Place the side lengthways along the bench, with the back edge facing you. Now cut a short length of wood 8" or 9" long and any width and thickness, not less than 2" × 1", otherwise it will be too difficult to hold. This piece forms a guide for the saw when sawing along the trench. Place it on the outside of trench with the edge of wood exactly on the line, then hold it firmly with your hand or use a "G" clamp to hold it in place. In a joint of this type, where the groove is stopped short, it is necessary to saw in such a way that the cut made by the saw is not carried right through to the front. To do this, hold the handle of the saw down and cut in an upward direction until the saw reaches the correct depth at back edge and the line showing the stop at the front. Now by careful sawing and using the front end of saw to cut its way deeper without cutting completely across, the saw can be made to cut right down to the correct depth all the way along the groove. To remove the waste you will require a ½" or ¾" chisel. Secure the side to the bench by means of clamps, then use the chisel in a horizontal direction; carefully remove the waste from the groove, working in an upward direction to begin with, then gradually making your cuts parallel with the top surface of side. If you have made the saw cuts correctly they will act as a guide, and you will see quite clearly when you have chiselled the groove deep enough. As an added precaution you should measure the depth frequently in order to keep the groove at the required depth.

5. The shelves are now marked out. A small piece must be removed from the front edge of each shelf so that the shelf will fit into the trench correctly. This piece of waste can be marked out completely with the gauge, by first of all setting it to ¼" and marking all the front edges at the same time, then altering the gauge to ½" and gauging from the front edge. You should now have marked out on the eight front corners an oblong ¼" by ½". Remove waste with tenon saw, holding shelf in vice, sawing across the front edge first to the required depth of ½"; then turning shelf upright, place chisel on the ½" line and give a sharp tap with the ball of hand. As

this cut is following the direction of the grain and is only ¼" deep, it will require very little effort to remove the waste piece. Having now completed the housings for the four shelves, try each one separately, removing any very tight spots, and starting with the top shelf. As you fit each one, number it, to facilitate final assembly.

6. With a pair of compasses mark out the radii on the sides at the top front corners. Using a tenon saw, cut off the corner at an angle of 45°, almost touching the curved line; this will save a lot of chiselling. Having sawn off as much as you are able, place side on bench with a piece of scrap wood underneath the corner to protect the top of bench, then carefully pare away waste until the curve is complete. Finish with a file and glass-paper. Use glass-paper wrapped round a suitable block of wood, and always work in the direction of the grain.

7. The carcass is now ready to glue together. Place one side flat on the bench with grooves uppermost, run glue into each groove, then apply glue to the appropriate end of each shelf and push into position. Glue the opposite end of shelves, then the grooves on the other side piece, and place in position; hammer the joints well home, using a scrap piece of wood to hammer upon, to prevent marking the sides. You should now check the sides and shelves for squareness with a try-square. If everything is right, place some heavy weights on top of side to hold it in position and allow the glue to harden; this should take at least 24 hours.

8. While the glue is setting, cut the back out of three-ply, taking care not to tear the edges with the saw. The tenon saw used at a suitable angle is generally the best tool, because the teeth are so fine; any fine-toothed saw will do, however. Another useful tip is to hold the ply on top of the bench so that the line to be sawn is only just over the edge; the edge of the bench will then support the fibres which tend to break away. When the glue has set on the carcass the back is placed into position and held firmly by using screws at appropriate points. If the ply is fairly thin, ½" screws will be quite long enough, as long as they are not too thin; size 6 will be quite suitable.

9. The pieces forming the plinth are now planed to their respective sizes and cut to length. The front corners are mitred together; this is done by careful measurement and a 45° set-square, the waste being sawn away at the correct angle. The two side pieces are fixed first by screws from the inside of the side pieces.

Two screws per side will be quite sufficient. The front piece is fitted, then glued into place and allowed to set. To strengthen the front of plinth, two or three blocks 2" × 1" × 1" are glued behind it, in the angle formed by the plinth and bottom shelf.

10. The whole job is now cleaned up and thoroughly glass-papered until all the surfaces are like glass. Remember always to work with the grain, to prevent scratches. Any slight discrepancies should be filled with suitable stopping, and then carefully sanded until flush with faces. If you intend darkening with water stain, quite a good precaution is to sponge the work down with clear water first. This raises the grain and it must be re-glass-papered, but when you apply the stain after this treatment you will find the grain will not be so bad, with the result that little or no glass-papering will be required. There is always a danger, in glass-papering after staining, of rubbing right through the stain to the bare wood, causing very unsightly patches.

Spirit or oil stain, as described earlier, is by far the best form of stain. The work can now be polished with brushing polish and later waxed to give it a nice egg-shell finish.

TWO EASILY MADE GATES

GATE NO. ONE (fig. 30). *Material required:*

4 pieces 2′ 6″ × 4″ × 1″ uprights.
3 pieces 3′ 0″ × 3″ × 1″ rails.
1 piece 3′ 3″ × 3″ × 1″ cross brace.
1 piece 4′ 0″ × 4″ × 1″ packing pieces.

Operations.

Screws are used throughout, no joints being required.

1. Plane and saw the four pieces forming uprights to the size given, then draw the following lines at right angles to the edge of one piece only. Starting at either end, measure the following distances, 2″, 3″, 4″, 3″, then from opposite end 2″ and 3″; the lines are then squared across the face side. Mark one other upright in the same way by holding it tightly against the first piece with the ends flush, then mark the lines across, using try-square.

2. The three rails are now cut to size and planed. Lay the two uprights flat on the floor and place the three rails in position, making

sure that the whole thing is quite square. Two holes are then bored into the ends of each rail to receive screws; next, having countersunk them ready, screw rails to uprights.

3. The cross bracing piece is then planed and held in position so that the angles at each end can be marked out. The waste is then

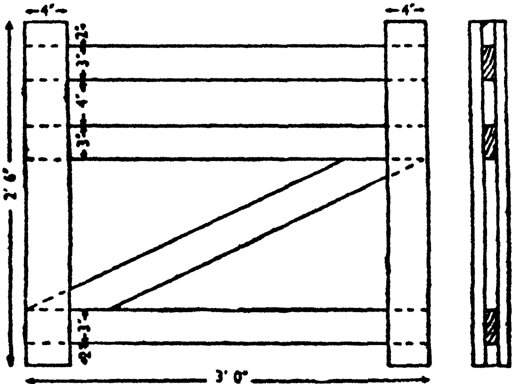


Fig. 30

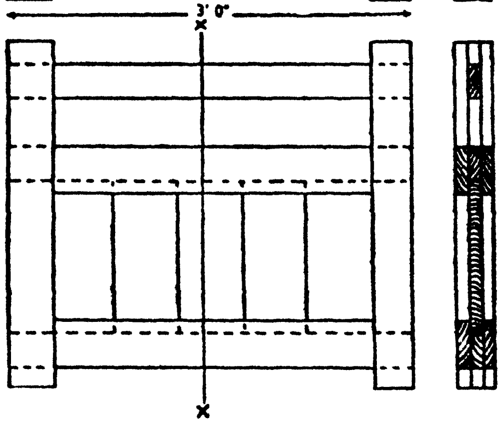


Fig. 31

sawn off. One screw in each end will be sufficient to hold it securely. Packing pieces are now cut from the 4" × 1" piece to fit in the gap between rails; these can be held in place by nails.

4. The remaining uprights are now placed on top of the rails and packing pieces and securely screwed, the screws being long enough to go through the three thicknesses. The measurements given can be adjusted to suit the size of gate required.

GATE No. TWO (fig. 31). *Material required:*

4 pieces 2′ 6″ × 4″ × 1″ uprights.
3 pieces 3′ 0″ × 3″ × 1″ rails.
4 pieces 2′ 4″ × 4″ × 1″ rails.
5 pieces 1′ 1″ × 5⅝″ × 1″ panel.
1 piece 4′ 0″ × 4″ × 1″ packing.

Operations.

This gate is made like the first, except that in place of the cross bracing there is a solid panel.

1. Screw the three cross members to the sides, insert the packing pieces and hold in place with nails, then screw the remaining two upright pieces in position.

2. Plane and saw to size the four pieces 2′ 4″ × 4″ × 1″. Screw one piece to the middle rail flush with the top edge, and another to the bottom rail flush with the bottom edge.

3. The five pieces forming the panel are now cut and planed to fit in between the two rails. The size given makes this an easy operation, but it is quite obvious that as long as the space between the rails is completely filled from side to side, any suitable size will do. These pieces are now placed in between the rails and resting on the ledges formed by the last two pieces screwed into position.

4. The two remaining pieces of 4″ × 1″ material are now screwed into position, thus holding the panel pieces firmly in place, as shown in section XX.

5. Before hanging, the gate should be well painted with a good priming coat of red lead paint, the final colour being applied when the gate is in position. Hinges should be bolted on if possible. A suitable catch completes the furnishing.

PICTURE FRAMES (figs. 32, 33)

Pictures and photographs are made in so many sizes that the actual dimensions of the frames shown are left out, so that you can make either frame to suit your own particular size. The first frame, however (fig. 32), is drawn to scale and is suitable for a photograph 8½″ × 6½″; this is a very popular size, and as most photographs bear some relationship to these sizes, you will find that the proportions will be correct in each case.

1. Plane the back piece first to the correct width, then saw to the length obtained from photograph. Wood ½″ thick will be quite suitable. Plane a slight bevel on the bottom edge to allow the back to lean away slightly.

2. Saw a piece of wood to fit across back at bottom edge and

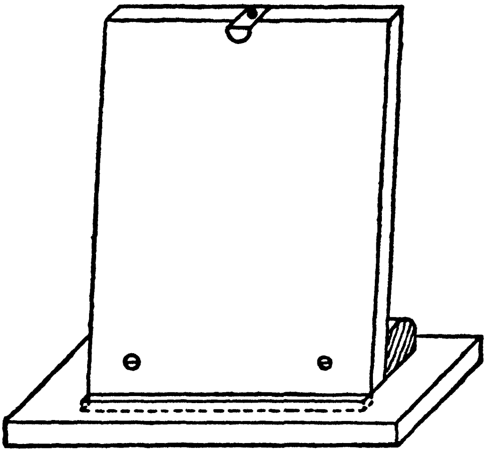


Fig. 32

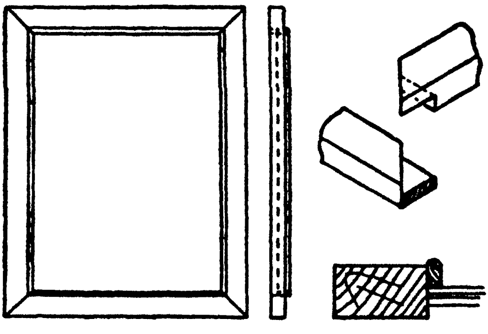


Fig. 33

plane it square; 1″ × 1″ is a suitable size. One edge of this piece is now carefully planed round as shown in drawing, and the bottom edge planed at a similar angle to the one on the bottom edge of back. This piece is screwed to back with two 1″ No. 8 screws, and the bottom then planed quite true.

3. The base is now planed and sawn to correct dimensions; the length should be at least 1½″ longer than the width of back, the

other two dimensions being 3" and ⅛". The bottom is then screwed to the 1" × 1" piece supporting the back.

4. A piece of glass should now be obtained of the same width as back but ⅛" longer. This is placed in position and a line drawn round it where it touches the base. Remove the glass and draw a line along the bottom edge of base. You will now have an oblong drawn on the base the size of the glass.

The back is unscrewed and the position of the glass marked with a gauge and knife. Make it a little wider than shown, to allow for the thickness of the photograph. If the gauge lines are cut deeply into the wood, the waste can easily be removed with a ⅛" chisel. When the groove is quite correct, screw back into place again and fit glass into position over the photograph. The glass should not be too tight in the groove and must be flush with the top edge of back. A small brass clip is now made to fit on the top to hold the glass in place. The stand should be glass-papered and polished or painted before final assembly.

5. While the stand is drying, carefully remove all sharp edges from the glass by rubbing them on an oilstone. The frame is now ready to assemble. Clean glass, then place in position over the photograph and hold in place with the brass clip. This is screwed on to the top edge of back.

The second frame (fig. 33) must also be made to size required.

1. The material is first planed to size; 1" × ⅝" is quite suitable. When cutting to length, remember you must add *twice* the width of the wood to the dimensions of the picture. The corners are held together with a mitred half-lap joint as shown in sketch. This can be glued, then screwed from the back, making an exceedingly strong joint, the front retaining a mitred appearance. A simple mitre, strangely enough, is far more difficult to make and look right, and is invariably knocked out of shape when nailing—unless you are an expert.

2. The glass is held in place with narrow beading, as shown in the sectional sketch. This may be purchased ready made, or a thin strip sawn off the edge of a suitable board. The top edge is rounded to give a clean appearance and allowed to stand out from frame. The corners are mitred and then held in place with panel pins, the heads of which can be cut off so that they will not show. If you make the beading with a different wood a very pleasing effect is obtained; for example, the frame can be made from oak and the

beading from walnut or mahogany, the light and dark forming a pleasant contrast.

4. The frame is now suitably protected with polish or painted.

5. The glass should now be thoroughly washed with soap and water, then with clean water, and dried. Polish with a piece of old newspaper. Fit into frame, then place the picture in position. A piece of thick cardboard should now be cut the same size and placed over the picture; this is held in place by driving nails at frequent intervals into the frame and pressing on back of cardboard. When everything is ready a piece of brown paper slightly larger than the frame is pasted over the whole of the back with flour paste or gloy, the edges being trimmed off when the paste has set. Two screw eyes are required for holding the cord; these should be attached about one-third of the way down the sides from the top.

TOBOGGAN (fig. 34)

Material required:

2 pieces 3′ 5″ × 8″ × 1″ runners.
1 piece 1′ 6″ × 8″ × 1″ seat.
2 pieces 1′ 6″ × 2″ × 1″ rails.
1 piece 1′ 6″ × 1½″ × 1½″ foot-rest.

Operations.

1. The two side pieces or runners are made first. Plane them to 8″ × 1″, or whatever thickness you have been able to obtain, then square the two ends the correct distance apart and saw off waste. With your gauge set at 6″, draw a line parallel with the bottom edge, then draw the curves forming the front of runners in freehand. The bottom curve should be a very full one so that the toboggan will slide easily. To remove the waste, make a saw-cut at right angles to the top edge about 9″ from the front end and going right down to the six-inch line. Then use a rip saw, and working on the waste-wood side of line, saw with the grain towards bottom of first saw-cut. The first saw-cut across the grain is to prevent the curved piece from being broken away if the wood splits in the process of sawing. Plane the rough edge as far as you can, then finish off with a spoke-shave. The curved ends can be sawn roughly to shape with a tenon saw, cutting at a tangent to the curve. This must also be made smooth with either a chisel or spokeshave. Having made one side

correctly, use this as a template to mark out the opposite side, then proceed to cut out in the same way.

2. The two rails are now planed to size and sawn to the correct length. The position of the two rails is next marked out on the top

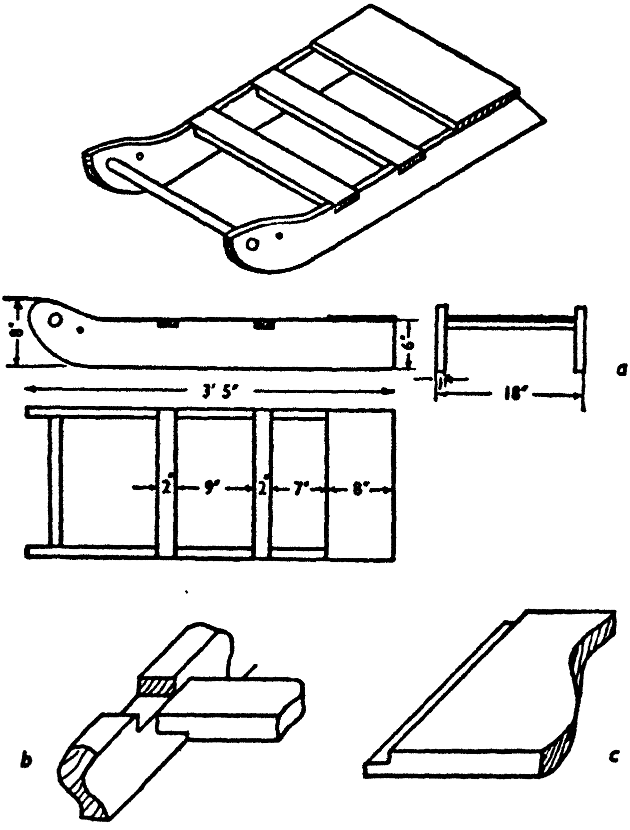


Fig. 34

edge. They fit into slots 2" wide and ¾" deep, ¼" being taken out of the ends of the rails themselves. (See fig. 34*b*.) When removing waste, remember that you must saw across the grain at each end of trench; if you attempt to chisel the whole joint out without using a saw, you will split the wood in the direction of the grain. So saw the ends first, chisel away waste second.

3. The foot-rest is now made from the piece of wood 18" × 1½" × 1½". Plane and saw to these dimensions first. To make it round proceed as follows. Find the centre of each end by drawing diagonal lines, then set your gauge to half the length of one of these diagonal lines. Gauge lines from each edge on all four sides; there will be two lines then on each side. Now place wood in vice with an edge uppermost and carefully plane off corner down to the first two lines, turn wood round to next corner, and proceed in the same way until you have an 8-sided piece of wood. By planing a little of the 16 corners, the wood will be perfectly round. Finish with a file, revolving the wood with the left hand as you file with the right. A little glass-papering will make it perfectly smooth.

4. Mark the centre of foot-rest where it comes on both sides of toboggan, then bore a 1" diameter hole in each side. You will notice that the hole is 1" diameter, while the wood is 1½" diameter. It is fitted in this way. Using the bit with which you bored the hole, draw a circle on each end of foot-rest; do not bore a hole in it. Then set your gauge to 1" and draw a line all the way round 1" from the end. We are now making a pin joint, which in principle is very much like a mortise and tenon, but instead of the mortise oblong it is round. Having gauged the line, make a saw cut about ¼" deep all the way round; this forms the shoulder. Then, fixing wood in vice at a convenient angle, cut away waste with a chisel, taking care not to pass the circle marked with centre bit. Leave the pin a little bigger than you require, then finish off with a file until it is a nice tight fit without having to be forced.

5. The foot-rest is now glued into position and also the rails, which should be bored to take two screws per joint. These rails are better screwed home after the glue has set; 2" No. 12 will be quite strong enough.

6. The seat is now taken in hand and planed to the correct size, then lap-halved at the end as shown in fig. 34*c*. The lap need only be ½" deep, and can be marked out completely with a gauge set first to 1", then to ½". A saw-cut is made across down to the ½" line, then if the wood is held upright in the vice, the waste can easily be removed with a mallet and chisel. Glue and screw into position, seeing that the heads are well below the surface, if you value your trousers.

7. Two holes are now bored in sides to receive rope for holding purposes. These need be only the diameter of rope which, when

passed through, can be knotted on ends to retain it. The position of holes is shown on side view. See that they are below the holes made for foot-rest, otherwise the sides will be considerably weakened.

8. To prevent the runners wearing away, a short length of half-round iron can be drilled and bent, then screwed to edge of runners.

9. Two coats of bright red paint will put the finishing touch to the job and make it the envy of everybody.

GARDEN CHAIR (fig. 35)

Material required:

2 pieces 14" × 2" × "—(1).
2 pieces 17" × 2" × "—(2).
2 pieces 2' 4" × 2" × "— (3).
2 pieces 21" × 2" × "—(4).
1 piece 18" × 2" × "— (5).
1 piece 18" × 2" × "—(6).
9 pieces 18" × 2" × "—(7).

Operations.

The whole of this chair is made from 2" × 1" slate battens, a material fairly easy to come by. It has one drawback, however, and that is its roughness; it is sold straight from the saw. By choosing carefully, however, some fairly clean pieces can be obtained, and if you are lucky and live near to a works with planing machines, you will for a matter of coppers get the wood planed on four sides. Failing this, saw them all to the sizes given and plane them smooth.

1. Select pieces 1, 2, 3, and 4, and arrange them to form side of chair by resting No. 1 and No. 3 on top of No. 2 and No. 4. No. 1 is at right angles to No. 4, No. 2 is 2" lower at rear end, and No. 3, forming the back, is set at an angle which can be obtained by drawing. When they are all nicely placed, carefully mark out where each will fit. The joint used is the ordinary lap-halving. The width of each joint being now marked, all you will have to do is to gauge for depth; this is half the thickness. All the joints are then cut out on these pieces, which on assembling should be the same as they were at first, except that this time they are all flush on the face side. Recesses are now cut in Nos. 1 and 4 to receive Nos. 5 and 6, the length being the width of wood and the depth half the thickness.

This side is glued and screwed together, the screws being inserted on the inner side.

2. The opposite side is made by laying the remaining pieces Nos. 1, 2, 3, and 4 on top of the side already made, then marking out the joints in the same way. By doing it in this way the sides will be alike when finished. When the glue has set, trim off all ends of joints projecting with saw and plane.

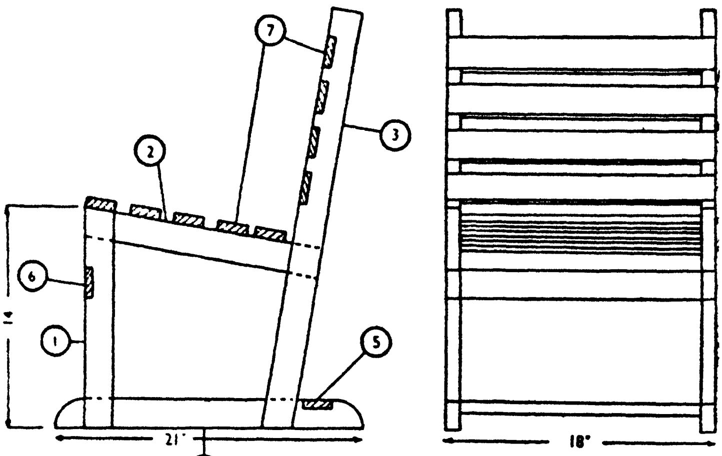


Fig. 35

3. Pieces Nos. 6 and 5 are now fitted into their respective recesses, then glued and screwed into place.

4. The seat battens must be planed up and lap-housed at each end; that is, from each end an oblong piece is removed as wide as the thickness of the rails and ¼" deep; this just permits the rails to hold seat battens in place. Plane off all sharp corners, then glue and screw into place.

5. The back rails are now planed up, then lap-halved into back pieces as shown. Glue and screw into place.

The completed chair should be glass-papered thoroughly, removing all sharp edges and corners. Piece No. 4 can have the ends rounded as shown, as also can the tops of side pieces. When the surfaces are quite smooth, paint the whole chair with red-lead undercoating to preserve the wood. The chair can then be painted in any colour desired.

DOG KENNEL (fig. 36)

It is suggested that for this kennel a suitable box be purchased and carefully pulled to pieces, taking great care in the process to prevent the wood from splitting. If the box is large enough, it is better to saw the sides away from the ends rather than hammer

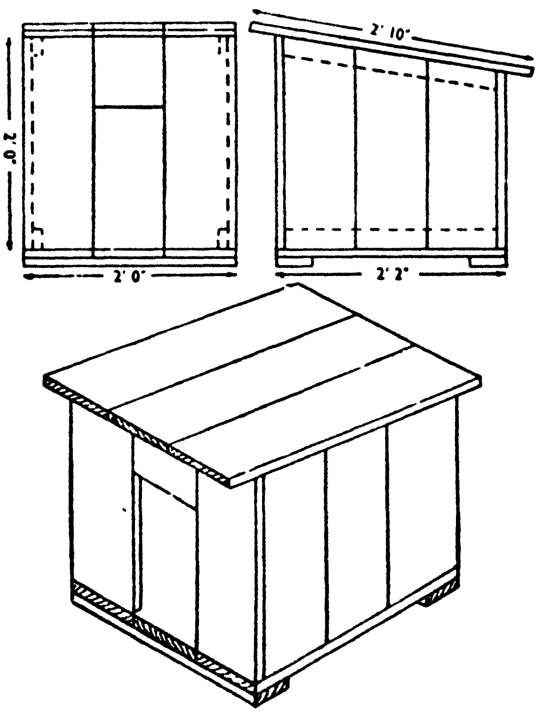


Fig. 36

them apart. From the drawings you will notice how easily it is built up from six sections. The bottom is 2′ 2″ long by 2′ 0″ wide, the pieces forming it being nailed to two battens, one at each end. The front is 2′ 0″ square, with the centre section cut short to make an entrance; two battens will hold the short centre section in place. The back is 20″ × 2′ 0″, formed in the same way. The two side pieces are made quite square first of all and nailed to the batten at

the bottom. The angle is now drawn. This is made by drawing a line from the front top corner to a mark 4" below the top back corner. The top batten is then nailed into position along this line and the waste piece above sawn away. The other side is made in the same way, only remember that the battens in this case must be on the opposite side. The roof is constructed in a similar way, and is 2′ 10″ × 2′ 0″. The battens in this case, however, are not on the extreme ends, but are made far enough back to permit them to fit inside.

The front and back are now nailed to sides. If you have made the battens too long on the front and back, you may have to saw a little off them to allow the sides to fit properly. Next nail the roof in position. It is suggested that the top of the kennel be made so that it can be removed from the base, so that the inside can be cleaned out. The easiest way to do this is to nail a framework on the base out of 1″ × 1″ wood, over which the top can be dropped, then held in place by a couple of hooks and eyes. The sharp corners or edges should all be planed off this framework, which serves two purposes: it will keep the kennel in position and prevent draughts. The top should be made weathertight by nailing a piece of roofing felt all over, allowing it to come down the sides a little way and wrap over the front and back of roof. The nails are driven in from the sides and underneath.

Before being used the whole kennel should be well painted or treated with preservative.

SAWING STOOL (fig. 37)

Material required:

4 pieces 15″ × 3″ × 3″ legs.
2 pieces 28″ × 4″ × 1″ side rails.
2 pieces 18″ × 4″ × 1″ end rails.
2 pieces 28″ × 8½″ × 1″ top.

Operations.

This type of sawing stool is very much more useful than the old-fashioned trestle, which requires another pair of hands to hold wood steady unless one possesses a pair of trestles, and even then they occupy far more room than they are worth. On this type of table the wood is held quite easily with either the foot or knee, the sawing

itself being done between the two top pieces. Besides the purpose for which it is intended it makes a most suitable table for a garden tea-party and can be used for many things, for all of which the trestle type would be useless.

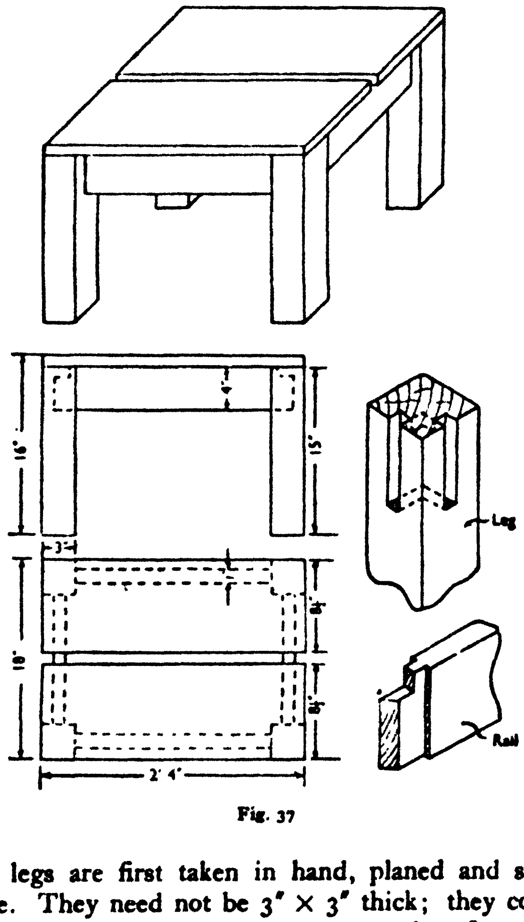


Fig. 37

1. The legs are first taken in hand, planed and sawn to the correct size. They need not be 3" × 3" thick; they could be any suitable size as long as they are strong enough—4" × 2" would be quite suitable.

2. The rails are planed up 4" × 1" and then cut to their respective sizes, the longer ones being 28" and the shorter ones 18".

3. The rails are haunched mortised and tenoned into the legs

as shown in sketch. Set out the mortises first with a mortise gauge if you have one, with an ordinary gauge if not, and the try-square. Then remove waste in the approved manner. You will notice that the mortises on each leg will meet in the middle of the leg. This acts as a guide to the correct depth and facilitates the cleaning out of mortises—a very difficult process in the stopped mortise and tenon joint.

4. Having cut out the 8 mortises, set out the tenon on the ends of the rails, using the try-square to mark out the shoulders. The distance between the shoulders should be 18" and 12" respectively. Cut away waste with tenon saw, then carefully measure the depth of mortise and cut the tenon to suit. Where the two tenons meet they are mitred so that the full length of tenon is retained.

5. Do not attempt to glue the whole frame up in one operation; glue the longer sides in first, and then, when this glue has hardened, glue the shorter rails in place. This makes the job very much easier to handle, always resulting in better work.

6. The two pieces forming the top are now planed up and cut to size. Lay in position and mark on them where the screws will be placed. Holes are then bored to receive them. Six screws will be required for each piece, 2" long, size 12; they should be suitably spaced apart. The top is screwed in place as soon as the glue has set on joints of legs.

7. The legs and rails can now be painted. There is very little point in painting the top, as this will be used for working on and in time will get badly scratched and marked. When the top pieces get to this stage, they can be removed and new pieces screwed in their place. As an extra protection to the end rails, where the saw is likely to catch, a piece of thick wood can be screwed in place at the end of slot on the inside of rails; when it is sawn nearly through it can be replaced by a similar piece.

TOOL CUPBOARD (fig. 38)

Material required:

2 pieces 24" × 5" × ¾" sides.
2 pieces 26" × 5" × ¾" top and bottom.
4 pieces 24" × 2" × ¾" frame for doors.
4 pieces 13" × 2" × ¾" frame for doors.
1 piece 24¾" × 4" × ¾" shelf.
1 piece 26" × 24" × 3/16" ply back.
2 pieces 24" × 13" × 3/16" ply for doors.

Operations.

1. Plane up the four pieces forming the actual cupboard, two being 24" long and two 26", both 5" wide and ¾" thick. Square the ends accurately and saw very carefully. If you have a shooting board, a little waste should be left on to shoot.

2. On the ends of the two long pieces set out the dovetails as shown in the side view, using your dovetail template to draw all sloping lines. Then with a saw and chisel remove the waste between the pins, as already described in the section on dovetails.

3. Having cut the pins out, mark the dovetails by laying the side flat on the bench and holding the top and then the bottom piece in position and marking round the pins in the proper way with a long pointed pencil. Before marking make quite sure the ends are flush on both sides and end. The length of dovetails should also be gauged before marking takes place. You then remove waste from round the dovetails carefully, remembering to make all saw cuts on waste side of line.

4. When all the joints are made and cleaned out, fit each corner in turn, marking in pairs as you go, to facilitate future assembling.

5. The position of the shelf is now marked on the inside of both sides; this should be just high enough to permit the planes to stand on the bottom shelf—6" should be ample for this purpose. Separate sides, then mark out trench with square and knife. Note that it does not go right across, but is stopped 1" from the front edge. Remove waste in the usual way, sawing as deeply as you can.

6. Glue the four dovetail joints together, making quite sure the box is square at the corners and all joints are well home. As a protection against being knocked out of shape, nail a strip of wood

across the cupboard diagonally. Then leave in a warm room until the glue has hardened.

7. The back is now cut and planed to fit. As this is made of ply, care is needed, particularly when sawing across the grain of the

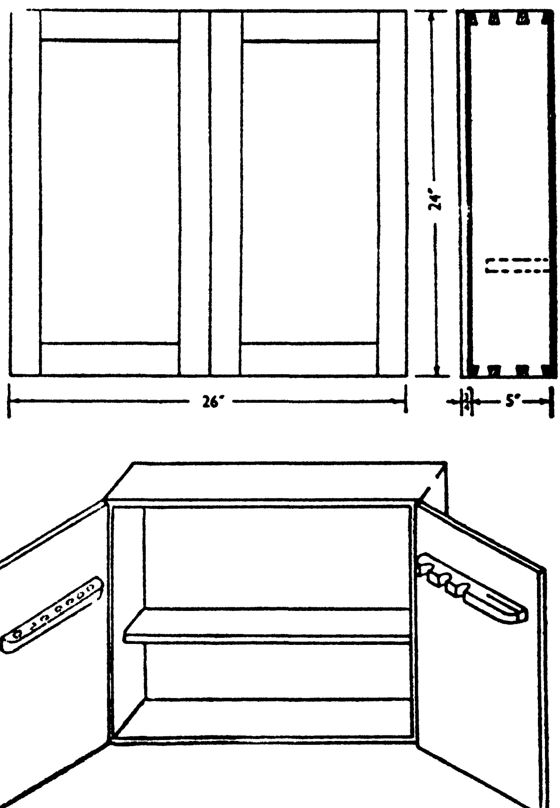


Fig. 38

outer ply; use the smallest-tooth saw you have and cut very close to the edge of the bench. The tenon saw is best for this purpose, and if held at an angle of about 30° will cut across any length. The actual planing of edges can be left until the back is in place. Having prepared the back, glue the shelf into position, then glue and screw the back in place; the screws for back should be about 6" apart all the way round. This completes the carcass.

8. The doors are now made. Plane up all the pieces that form the framework of the doors to the correct sizes, as shown in cutting list. There are two joints you can use in making the frames, the haunched mortise and tenon, or the simple lap-halving. Decide which you prefer, then set them out as already shown in the section referring to these two particular joints (p. 584). When you have made all the joints, fit the frames together and then test them for size against the cupboard, and also for being square. If they are right, you can glue them together. If the lap-halving joint has been used, a couple of screws in each joint, as well as glue, will make them more easily handled. While the glue is setting, cut out the pieces of plywood ready to cover them. Make them slightly larger than required, then they can be planed after they are glued and nailed into place.

9. Each door is hinged with two brass hinges 2" long. They must be sunk their total thickness into the sides of cupboard and just screwed on to the plywood back of doors. Fit a bolt or catch on the left-hand door and a lock on the right-hand door. This completes the actual carcass; all that remains to do now is to fit the inside to hold tools.

10. The inside of the two doors can be fitted up to carry the lighter tools such as chisels, gouges, bits, hammer, mallet, square, gauge, rule, &c. These can be held by suitable racks screwed on to the doors as shown in the illustration. The larger tools can be housed inside on suitable clips. Shelves for various purposes, such as holding nails and screws. (Talking of nails, save all the small glass jars you come across; they make excellent nail boxes, and you can see at a glance just the nail you want.)

11. The cupboard is fastened to wall by means of two screws and Rawlplugs. The screws are driven in from inside the cupboard, and should be about 6" from the top and sides. The cupboard can be either painted or polished to match the furniture, and will prove a great asset and make work a pleasure.

CARVED NAMEPLATE (fig. 39)

This is quite a simple piece of work, in which the art of carving can be practised with the aid of a single carving gouge of small radius, say ¼", ⅜" or ½". The first essential is a suitable piece of wood, not too hard yet having a fairly close grain, such as satin walnut. This material is really ideal for the beginner, and odd pieces can be picked up fairly easily. An alphabet suitable for carving is illustrated, and it is suggested that before setting out the name required on the wood itself a full-size drawing should be made; this will allow for correcting any faulty spacing and will give you the correct size of the wood required. The letters should not be less than 2" high, and the space between each letter and between letters and border should be sufficient to allow easy manipulation of carving tool. Having drawn the nameplate full size, it can be transferred to the wood by carbon paper, the piece of wood being prepared beforehand. If you allow 2" extra waste on each end, the wood can be held firmly by a pair of G clamps to the bench, or it can be screwed to a thick piece of wood and held in the vice.

The gouge should be sharpened properly before any work is attempted. This process is described earlier (p. 577).

The carving itself is started by cutting round each letter in turn, carefully cutting to line of letter with gouge on the waste side of line—the shaded portion of drawing. The depth of cut should be at least ⅛" or 3/16". When all the letters have been cut the border is treated in the same way, leaving in each corner sufficient material to hold screws as shown. The wood between is now removed by gouge, cutting across the grain wherever possible, and carefully keeping each cut the same depth. When all the shaded portion is removed and the letters are standing out clearly, the carved portion can be finished in a number of ways. It can be made quite flat and smooth with an ordinary chisel, or it can be "matted" with a matting tool. This consists of a short length of round iron that has been filed in such a way that the end is a series of pyramids. These are obtained by making a number of file cuts with a three-cornered file across one end, then filing in a similar way at right angles to the first cuts. In elevation they look like a saw edge. By holding the tool firmly and tapping squarely with a hammer a series of indentations is made, the tool being gradually worked all over the carved

portion. The result is an even background covered by dots pressed into the wood. A more artistic background can be produced by using the gouge in such a way that the back is covered with a series of gouge marks similar in shape to, say, a spoon, but very much smaller.

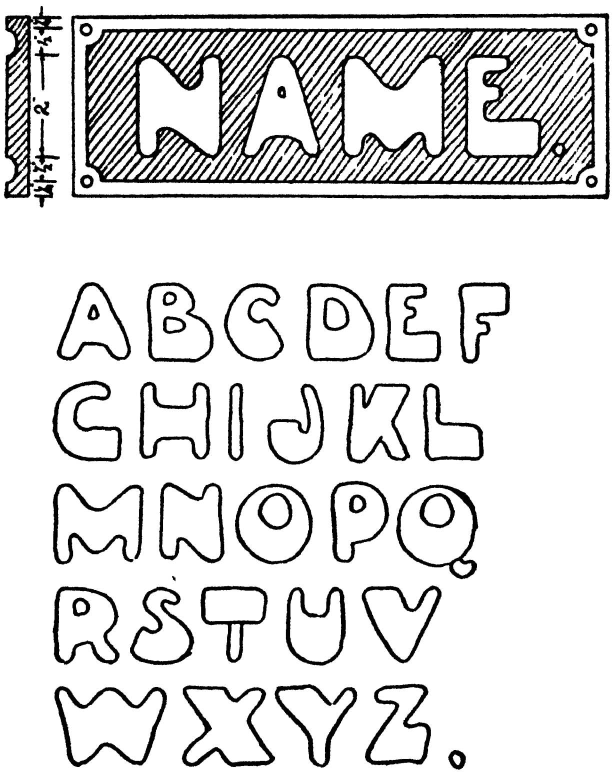


Fig. 39

Holes should be bored in each corner to take screws, the waste at each end sawn off, and the ends made smooth.

If gouge marks have been left in carving, a very interesting effect can be obtained by staining the carved part itself with Jacobean stain put on fairly thickly, that is, the stain made as black as possible. When it has dried, carefully glass-paper between letters, and a series of high lights will be left where the stain has been removed. Finally, the whole plate should be varnished or polished.

PARQUETRY STAND (fig. 40)

Parquetry is a system whereby the design is built up on a base by suitably shaped pieces of wood of different varieties.

This stand can be used for many purposes or the design may be adapted to other useful articles.

1. First of all, draw the design full size on a piece of thin card. Then number the sections in such a way that you know exactly where each one fits; the numbers on fig. 40*b* are not for this purpose, but are to show the type of wood used for each section. Having suitably numbered the sections, cut out each section accurately, using a sharp knife or razor blade. Then put all the bits in an envelope until required at a later stage.

2. A piece of American whitewood is now sawn and planed to finished size, 5½″ × 5½″ × 1″; this is to form the base. To prevent any warping that may take place, a piece of 1½″ × ½″ wood is housed across the grain, then glued and screwed into place. The bottom may now be planed quite flat after seeing that all screw heads are well below the surface. The design should then be drawn on base by placing the pieces already cut and drawing round them.

3. Now extract from the design all the cards marked by (1) in fig. 40*b*. These pieces are made in ash or other wood light in appearance. By laying the four pieces end to end, the required size of piece can be obtained. Having planed it to ¼″ thick, mark out each shape in turn, using the cut cards as templates; employ a very sharp pencil. It is also advisable to cut lines with a knife after marking with pencil. Saw and carefully chisel out each shape, keeping sides quite square with faces. When they are right glue them to base board and allow to set. Just before the glue becomes too hard, remove any surplus from around the edges with a chisel dipped in hot water.

4. The pieces marked (2) are next cut to shape in walnut, once again using the cards as templates to obtain the correct shapes. These pieces are fitted into position and may want a little adjustment to make them right; once they fit correctly they may be glued into place.

5. Continuing to build the design round the centre star, the triangles marked (3) and (4) must be cut to shape in sycamore (3) and mahogany (4). Mark out four of each and cut out as before.

You will find that, as the design gets bigger and more parts are added, great accuracy is required if the parts are to fit without a great deal of paring of edges. Parts 3 and 4 are now glued, and while the glue is setting the outer ring of triangles is marked out in the same wood, only this time you will notice that they are the reverse, so that you have a dark against a light one.

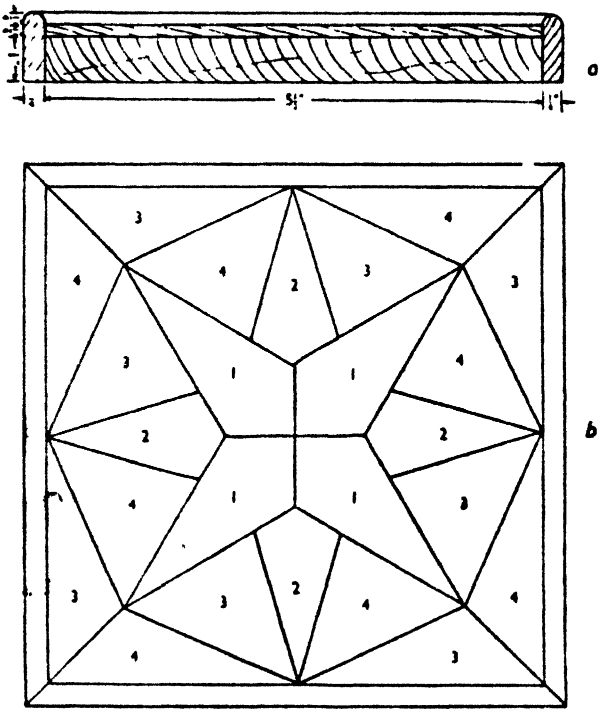


Fig. 40

6. When all the pieces are glued into place and the glue set hard, the edges can be planed flush with base board. All that remains to be done now is to saw a strip of walnut about 26″ long × $1\frac{1}{8}$″ × $\frac{1}{4}$″, this being the finished size. Plane one edge round as shown in fig. 40*a*, then make a mitred framework to fit all the way round the base. This is glued into place after the surface of the parquetry has been thoroughly glass-papered flat; the whole thing being polished with wax.